NASA SP-7039 (06)
Section 1
Abstracts

PATENT ABSTRACTS
A CONTINUING BIBLIOGRAPHY
Section 1 • Abstracts
JANUARY 1975
**ACCESSION NUMBER RANGES**

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This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Informatics Information Systems Company.
Annotated references to NASA-owned inventions covered by U.S. patents and applications for patent that were announced in *Scientific and Technical Aerospace Reports (STAR)* between July 1974 and December 1974.
This Supplement is available from the National Technical Information Service (NTIS), Springfield, Virginia 22151, for $3.00. For copies mailed to addresses outside the United States, add $2.50 per copy for handling and postage.
INTRODUCTION

Several thousand inventions result each year from the aeronautical and space research supported by the National Aeronautics and Space Administration. The inventions having important use in government programs or significant commercial potential are usually patented by NASA. These inventions cover practically all fields of technology and include many that have useful and valuable commercial application.

NASA inventions best serve the interests of the United States when their benefits are available to the public. In many instances, the granting of nonexclusive or exclusive licenses for the practice of these inventions may assist in the accomplishment of this objective. This bibliography is published as a service to companies, firms, and individuals seeking new, licensable products for the commercial market.

The NASA Patent Abstracts Bibliography (NASA PAB) is a semiannual NASA publication containing comprehensive abstracts and indexes of NASA-owned inventions covered by U.S. patents and applications for patent. The citations included in NASA PAB were originally published in NASA's Scientific and Technical Aerospace Reports (STAR) and cover STAR announcements made since May 1969.

For the convenience of the user, each issue of NASA PAB has a separately bound Abstract Section (Section 1) and Index Section (Section 2). Although each Abstract Section covers only the indicated six-month period, the Index Section is cumulative covering all NASA-owned inventions announced in STAR since May 1969. Thus a complete set of NASA PAB would consist of the Abstract Section of Issue 04 (January 1974), the Abstract Section for all subsequent issues, and the Index Section for the most recent issue.

The 193 citations published in this issue of the Abstract Section cover the period July 1974 through December 1974. The Index Section contains references to the 2757 citations covering the period May 1969 through December 1974.

ABSTRACT SECTION (SECTION 1)

The Abstract Section is divided into 34 subject categories (See Table of Contents for scope note of each category) under which are grouped appropriate NASA inventions. Each entry in the Abstract Section consists of a STAR citation accompanied by an abstract and a key illustration taken from the patent or application for patent drawing. Entries are arranged in subject category in order of the ascending NASA Accession Number originally assigned in STAR to the invention. The range of NASA Accession Numbers within each issue is printed on the inside front cover.

Abstract Citation Data Elements: Each of the abstract citations has several data elements useful for identification and indexing purposes, as follows:

NASA Accession Number
NASA Case Number
Inventor’s Name
Title of Invention
U.S. Patent Application Serial Number
U.S. Patent Number (for issued patents only)
U.S. Patent Office Classification Number(s)
(for issued patents only)

These data elements appear in the citation of the abstract as depicted in the Typical Citation and Abstract reproduced below and are also used in the several indexes.

TYPICAL CITATION AND ABSTRACT FROM
PATENT ABSTRACTS BIBLIOGRAPHY

NASA SPONSORED DOCUMENT

NASA ACCESSION NUMBER

NASA TITLE

INVENTOR

NASA CASE NUMBER

AVAILABILITY

ABSTRACT

An apparatus for reducing the effects of aircraft wingtip vortices is discussed. The device consists of a spline structure containing hinged and retractable flat plates which create a positive pressure gradient in the area downstream of the wing trailing edge. This positive pressure gradient causes the vortex to dissipate by forcing the linear air flow around and through the core of the vortex. Alternate configurations in the form of a drag chute or a wingtip mounted engine are considered.

NASA

NTIS HC $4.00 CSCL O1C


WINGTIP VORTEX DISSIPATOR FOR AIRCRAFT Patent Application

James C. Patterson, Jr., inventor (to NASA) Issued 24 May 1974 12 p

SOURCE

US PATENT APPLICATION SERIAL NUMBER

COSATI CODE

NASA

Langley Research Center, Langley Station, Va.

N74-26456# National Aeronautics and Space Administration

available on MICROFICHE
INDEX SECTION (SECTION 2)

The Index Section is divided into five indexes which are cross-indexed and are useful in locating a single invention or groups of inventions.

Each of the five indexes utilizes basic data elements: (1) Subject Category Number, (2) NASA Accession Number, and (3) NASA Case Number, in addition to other specific index terms.

**Subject Index**: Lists all inventions according to appropriate alphabetized technical term and indicates the related NASA Case Number, the Subject Category Number, and the NASA Accession Number.

**Inventor Index**: Lists all inventions according to alphabetized names of inventors and indicates the related NASA Case Number, the Subject Category Number, and the NASA Accession Number.

**Source Index**: Lists all inventions according to alphabetized source of invention (i.e., name of contractor or government installation where invention was made) and indicates the related NASA Case Number, the Subject Category Number, and the NASA Accession Number.

**Number Index**: Lists inventions in order of ascending (1) NASA Case Number, (2) U.S. Patent Application Serial Number, (3) U.S. Patent Classification Number, and (4) U.S. Patent Number and indicates the related Subject Category Number and the NASA Accession Number.

**Accession Number Index**: Lists all inventions in order of ascending NASA Accession Number and indicates the related Subject Category Number, the NASA Case Number, the U.S. Patent Application Serial Number, the U.S. Patent Classification Number, and the U.S. Patent Number.

**HOW TO USE THIS PUBLICATION TO IDENTIFY NASA INVENTIONS**

To identify one or more NASA inventions within a specific technical field or subject, several techniques are possible when using the flexibility incorporated into the *NASA PAB*.

1. **Using Subject Category**: To identify all NASA inventions in any one of the 34 subject categories in this issue of *NASA PAB*, select the desired Subject Category in the Abstract Section and find the inventions abstracted thereunder. The abstracts are arranged in each Subject Category in order of the ascending Accession Number originally assigned in STAR to each invention.

2. **Using Subject Index**: To identify all NASA inventions listed under a desired technical subject index term, (A) turn to the cumulative Subject Index in the Index Section and find the invention(s) listed under the desired technical subject term. (B) Note the indicated
Accession Number and the Subject Category Number. (C) Using the indicated Accession Number, turn to the inside front cover of the Index Section to determine which issue of the Abstract Section includes the Accession Number desired. (D) To find the abstract of the particular invention in the issue of the Abstract Section selected, (i) use the Subject Category and (ii) use the Accession Number to locate the desired invention within the Subject Category listing.

(3) Using Patent Classification Index: To identify all inventions covered by issued NASA patents (does not include applications for patent) within a desired Patent Office Classification. (A) turn to the Patent Classification Number in the Number Index of Section 2 and find the associated invention(s), and (B) follow the instructions outlined in (2)(B), and (D) above.

PUBLIC AVAILABILITY OF COPIES OF PATENTS AND PATENT APPLICATIONS

Copies of U.S. patents may be purchased directly from the U.S. Patent Office, Washington, D.C. 20231, for fifty cents a copy.

Copies of pending NASA applications for patent abstracted in NASA PAB are sold by the National Technical Information Service, Springfield, Virginia 22151, at the price shown in the citation. Microfiche are sold at the established unit price of $2.25. When ordering copies of an application for patent from NTIS, the U.S. Patent Application Serial Number listed in the index or shown in the citation for each abstract should be used to identify the desired application for patent.

LICENSES FOR COMMERCIAL USE: INQUIRIES AND APPLICATIONS FOR LICENSE

NASA inventions, abstracted in NASA PAB, are available for nonexclusive or exclusive licensing in accordance with the NASA Patent Licensing Regulations. It is significant that all licenses for NASA inventions shall be by express written instruments and that no license will be granted or implied in a NASA invention except as provided in the NASA Patent Licensing Regulations.

Inquiries concerning the NASA Patent Licensing Program or the availability of licenses for the commercial use of NASA-owned inventions covered by U.S. patents or pending applications for patent should be forwarded to the NASA Patent Counsel of the NASA installation having cognizance of the specific invention, or the Assistant General Counsel for Patent Matters, Code GP, National Aeronautics and Space Administration, Washington, D.C. 20546. Inquiries should refer to the NASA Case Number, the Title of the Invention, and the U.S. Patent Number or the U.S. Application Serial Number assigned to the invention as shown in NASA PAB.

The NASA Patent Counsel having cognizance of the invention is determined by the first three letters or prefix of the NASA Case Number assigned to the invention. The addresses of NASA Patent Counsels are listed alongside the NASA Case Number prefix letters in the following table. Formal application of license must be submitted on the NASA Form. Application for NASA Patent License, which is available upon request from any NASA Patent Counsel.
<table>
<thead>
<tr>
<th>NASA Case Number Prefix Letters</th>
<th>Address of Cognizant NASA Patent Counsel</th>
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</table>
| ARC-xxxxx XAR-xxxxx             | Ames Research Center  
Mail Code: 200-11A  
Moffett Field, California 94035  
Telephone: (415)965-5104 |
| ERC-xxxxx XER-xxxxx             | NASA Headquarters  
Mail Code: GP  
Washington, D.C. 20546  
Telephone: (202)755-3954 |
| GSC-xxxxx XGS-xxxxx             | Goddard Space Flight Center  
Mail Code: 204  
Greenbelt, Maryland 20771  
Telephone: (301)982-2351 |
| LAR-xxxxx XLA-xxxxx             | Langley Research Center  
Mail Code: 456  
Langley Station  
Hampton, Virginia 23365  
Telephone: (804)827-3725 |
| LEW-xxxxx XLE-xxxxx             | Lewis Research Center  
Mail Code: 500-311  
21000 Brookpark Road  
Cleveland, Ohio 44135  
Telephone: (216)433-6346 |
| MSC-xxxxx XMS-xxxxx             | Lyndon B. Johnson Space Center  
Mail Code: AM  
Houston, Texas 77058  
Telephone: (713)483-4871 |
| MFS-xxxxx XMF-xxxxx             | George C. Marshall Space Flight Center  
Mail Code: CCO1  
Huntsville, Alabama 35812  
Telephone: (205)453-0020 |
| NPO-xxxxx XNP-xxxxx             | NASA Pasadena Office  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, California 91103  
Telephone: (213)354-2700 |
Chapter V—National Aeronautics and Space Administration

PART 1245—PATENTS

Subpart 2—Patent Licensing Regulations

1. Subpart 2 is revised in its entirety as follows:

Sec.
1245.200 Scope of subpart.
1245.201 Definitions.
1245.202 Basic considerations.
1245.203 Licenses for practical application of inventions.
1245.204 Other licenses.
1245.205 Publication of NASA inventions available for license.
1245.206 Application for nonexclusive license.
1245.207 Application for exclusive license.
1245.208 Processing applications for license.
1245.209 Royalties and fees.
1245.210 Reports.
1245.211 Revocation of licenses.
1245.212 Appeals.
1245.213 Litigation.
1245.214 Address of communications.

Authority: The provisions of this Subpart 2 issued under 42 U.S.C. 2457, 2473(b) (3).

§ 1245.200 Scope of subpart.

This Subpart 2 prescribes the terms, conditions, and procedures for licensing of inventions covered by U.S. patents and patent applications for which the Administrator of the National Aeronautics and Space Administration holds title on behalf of the United States.

§ 1245.201 Definitions.

For the purpose of this subpart, the following definitions apply:

(a) "Invention" means an invention covered by a U.S. patent or patent application for which the Administrator of NASA holds title on behalf of the United States and which is designated by the Administration as appropriate for the grant of license(s) in accordance with this subpart.

(b) "To practice an invention" means to make or have made, use or have used, sell or have sold, or otherwise dispose of according to law any machine, article of manufacture or composition of matter physically embodying the invention, or to use or have used the process or method comprising the invention.

(c) "Practical application" means the manufacture in the case of a composition of matter or product, the use in the case of a process, or the operation in the case of a machine, under such conditions as to establish that the invention is being utilized and that its benefits are reasonably accessible to the public.

(d) "Special invention" means any invention designated by the NASA Assistant General Counsel for Patent Matters to be a short-form licensing procedure. An invention may be designated as a special invention when a determination is made that:

(1) Practical application has occurred and is likely to continue for the life of the patent and for which an exclusive license is not in force, or

(2) The public interest would be served by the expeditious granting of a nonexclusive license for practice of the invention in the fields of use or for geographical locations covered by the application for the exclusive license.

(e) The "Administrator" means the Administrator of the National Aeronautics and Space Administration, or his designee.

(f) "Government" means the Government of the United States of America.

(g) The "Inventions and Contributions Board" means the NASA Inventions and Contributions Board established by the Administrator of NASA within the Administration in accordance with section 305 of the National Aeronautics and Space Act of 1958 as amended (42 U.S.C. 2457).

§ 1245.202 Basic considerations.

(a) Much of the new technology resulting from NASA sponsored research and development in aeronautical and space activities has application in other fields. NASA considers it important that the public interest be served by the practical development and utilization of this new technology. In addition, NASA has been given unique requirements to protect the interests of the United States in the protection of the inventions resulting from NASA activities and to promulgate licensing regulations to encourage commercial use of these inventions.

(b) NASA-owned inventions will best serve the interests of the United States when they are brought to practical application in the shortest time possible. Although NASA encourages the nonexclusive licensing of its inventions to promote competition and achieve their widest possible utilization, the commercial development of certain inventions calls for a substantial capital investment which private manufacturers may be unwilling to risk under a nonexclusive license. It is the policy of NASA to seek exclusive licensees to provide the necessary incentive to the licensee to achieve practical application of the invention.

(c) The Administrator, in determining whether to grant an exclusive license to an applicant for a special invention, will evaluate all relevant information submitted by applicants and all other persons and will consider the necessity for further technical and market development of the invention, the capabilities of prospective licensees, their proposed plans to undertake the required investment and development, the impact on competitors, and the benefits of the invention to the Government and to the public. Preference for exclusive license shall be given to U.S. citizens or companies who intend to manufacture or use, in the case of a special invention, the invention in the United States of America, its territories and possessions, Puerto Rico, and the District of Columbia, or in any lesser geographic portion thereof.

(d) All licenses for inventions shall be by express written instruments. No license shall be granted either expressly or by implication, for a NASA invention except as provided for in § 1245.203 and 1245.204 and in any existing or future treaty between the United States and any foreign government.

(e) Licenses for inventions covered by NASA-owned foreign patents and patent applications shall be granted in accordance with the NASA Foreign Patent Licensing Regulations (§ 1245.4).

§ 1245.203 Licenses for practical application of inventions.

(a) General. As an incentive to encourage practical application of inventions, licenses will be granted to responsible applicants according to the circumstances and conditions set forth in this section.

(b) Nonexclusive licenses. (1) Each invention will be made available to responsible applicants for nonexclusive, revocable licensing in accordance with § 1245.206, consistent with the provisions of any existing exclusive license.

(2) The duration of the license shall be for a period as specified in the license.

(c) The license shall require the licensee to achieve the practical application of the invention and to then practice the invention for the duration of the license.

(d) The license may be granted for all or any part of the fields of use of the invention and for all or any part of the geographical locations covered by the application for the exclusive license.

(e) Licenses for inventions covered by NASA-owned foreign patents and patent applications shall be granted in accordance with the NASA Foreign Patent Licensing Regulations (§ 1245.4).

§ 1245.204 Other licenses.

(a) General. As an incentive to encourage practical application of inventions, licenses will be granted to responsible applicants according to the circumstances and conditions set forth in this section.

(b) Nonexclusive licenses. (1) Each invention will be made available to responsible applicants for nonexclusive, revocable licensing in accordance with § 1245.206, consistent with the provisions of any existing exclusive license.

(2) The duration of the license shall be for a period as specified in the license.

(c) The license shall require the licensee to achieve the practical application of the invention and to then practice the invention for the duration of the license.

§ 1245.205 Publication of NASA inventions available for license.

(5) The license shall extend to the subsidiaries and affiliates of the licensee and shall be nonassignable without approval of the Administrator. NASA, except to the successor of that part of the licensee's business to which the invention pertains.

(c) Short-form nonexclusive licenses. A nonexclusive, revocable license for a special invention, as defined in § 1245.201 (d), shall be granted upon written request, to any applicant by the Patent Counsel of the NASA installation having cognizance of the invention.

(d) Exclusive licenses. (1) A limited exclusive license may be granted on an invention available for such licensing provided that:

(i) The Administrator has determined that: (a) The invention has not been brought to practical application by a nonexclusive licensee in the fields of use or in the geographical locations covered by the application for the exclusive license; (b) The exclusive license will provide the necessary incentive to the licensee to achieve practical application of the invention; and

(ii) Either a notice pursuant to
§ 1245.205 Listing the invention as available for licensing has been published in the Federal Register listing inventions available for licensing. Abstracts of the inventions will also be published in the NASA Scientific and Technical Information Service (STAR) and other NASA publications.

(b) Copies of pending patent applications for inventions abstracted in STAR shall be furnished from the National Technical Information Service, Springfield, Va. 22151.

§ 1245.206 Application for nonexclusive license.

(a) Submission of application. An application for a nonexclusive license under § 1245.203(b) or a short-form nonexclusive license for special inventions under § 1245.203(c) shall be addressed to the NASA Patent Counsel of the NASA installation having cognizance over the NASA invention for which a license is desired or to the NASA Assistant General Counsel for Patent Matters.

(b) Contents of an application for nonexclusive license. An application for nonexclusive license under § 1245.203(b) shall include:

(1) Identification of invention for which license is desired, including the NASA patent case number, patent application serial number or patent number, title and date, if known;

(2) Name and address of the person, company or organization applying for the license and whether the applicant is a U.S. citizen or a U.S. corporation;

(3) Name and address of representative of applicant to whom correspondence should be sent;

(4) Nature and type of applicant's business;

(5) Number of employees;

(6) Purpose for which license is desired;

(7) A statement that contains the applicant's best knowledge of the extent to which the invention is being practiced by private industry and the Government;

(8) A description of applicant's capability and plan to undertake the development and marketing required to achieve the practical application of the invention, including the geographical location where the applicant plans to manufacture or use, in the case of a process, the invention; and

(9) A statement indicating the minimum term of years the applicant desires to be licensed.

(c) Contents of an application for a short-form nonexclusive license. An application for a short-form nonexclusive license under § 1245.203(c) for a special invention shall include:

(1) Identification of invention for which license is desired, including the NASA patent case number, patent application serial number or patent number, title and date, if known;

(2) Name and address of company or organization applying for license; and

(3) Name and address of representative of applicant to whom correspondence should be sent.

§ 1245.207 Application for exclusive license.

(a) Submission of application. An application for exclusive license under § 1245.203(d) may be submitted to NASA at any time. An application for exclusive license shall be addressed to the NASA Assistant General Counsel for Patent Matters.

(b) Contents of an application for exclusive license. In addition to the requirements set forth in § 1245.206(b), the application for an exclusive license shall include:

(1) Applicant's status, if any, in any one or more of the following categories:

(i) Small business firm;

(ii) Minority business enterprise;

(iii) Location in a surplus labor area;

(iv) Location in a low-income urban area; and

(v) Location in an area designed by the Government as economically depressed.

(2) A statement indicating the time, expenditure, and other acts which the applicant considers necessary to achieve practical application of the invention; and the applicant's offer to invest that sum and to perform such acts if the license is granted;

(3) A statement whether the applicant would be willing to accept a license for all or less than all fields of use of the invention throughout the United States of America, its territories and possessions, Puerto Rico, and the District of Columbia, or in any lesser geographic portion thereof.

(4) A statement indicating the amount of royalty fees or other consideration, if any, the applicant would be willing to pay the Government for the exclusive license.

(5) Any other facts which the applicant believes to show it to be in the interests of the United States of America for the Administrator to grant an exclusive license rather than a nonexclusive li-
Contributions Board receives In writing that NASA will grant the exclusive license unless within 30 days of the publication of such notice the Inventions and Contributions Board shall transmit to the Administrator the record of proceedings, its findings of fact, and its recommendations with respect to disposition of the appeal. The decision on the appeal shall be made by the Administrator, and such decision shall be final and conclusive, except on questions of law, unless determined by a court of competent jurisdiction to have been fraudulent, or capricious, or arbitrary, or so grossly erroneous as necessarily to imply bad faith, or not supported by substantial evidence. § 1245.213 Litigation.

Any person desiring to file an appeal pursuant to § 1245.211(e) shall address the appeal to Chairman, Inventions and Contributions Board. Any person filing an appeal shall have the opportunity to be heard before the Inventions and Contributions Board, and to offer evidence in support of his appeal. The Board shall make findings of fact and recommendations with respect to disposition of the appeal. The decision on the appeal shall be made by the Administrator, and such decision shall be final and conclusive, except on questions of law, unless determined by a court of competent jurisdiction to have been fraudulent, or capricious, or arbitrary, or so grossly erroneous as necessarily to imply bad faith, or not supported by substantial evidence. § 1245.213 Litigation.

An exclusive licensee shall be granted the right to sue at his own expense any party who infringes the rights set forth in his license and covered by the licensed patent. The licensee may join the Government, upon consent of the Attorney General, as a party complainant in such suit without expense to the Government and the licensee shall pay costs and any final judgment or decree that may be rendered against the Govern-
PATENT LICENSING REGULATIONS

ment in such suit. The Government shall also have an absolute right to intervene in any such suit at its own expense. The licensee shall be obligated to promptly furnish to the Government, upon request, copies of all pleadings and other papers filed in any such suit and of evidence adduced in proceedings relating to the licensed patent including, but not limited to, negotiations for settlement and agreements settling claims by a licensee based on the licensed patent, and all other books, documents, papers, and records pertaining to such suit. If, as a result of any such litigation, the patent shall be declared invalid, the licensee shall have the right to surrender his license and be relieved from any further obligation thereunder.

§ 1245.214 Address of communications.
(a) Communications to the Assistant General Counsel for Patent Matters in accordance with §§ 1245.206, 1245.207 and requests for information concerning licenses for NASA inventions should be addressed to the Assistant General Counsel for Patent Matters, Code GP, National Aeronautics and Space Administration, Washington, D.C. 20546.
(b) Communications to the Inventions and Contributions Board in accordance with §§ 1245.208, 1245.211, and 1245.212 should be addressed to Chairman, Inventions and Contributions Board, National Aeronautics and Space Administration, Washington, D.C. 20546.

Effective date. The regulations set forth in this subpart 2 are effective April 1, 1972.
JAMES C. FLETCHER,
Administrator.

NASA FOREIGN PATENT LICENSING REGULATIONS

Selected NASA inventions are also available for licensing in countries other than the United States in accordance with the NASA Foreign Patent Licensing Regulation (14 C.F.R. 1245.4), a copy of which is available from any NASA Patent Counsel.
TABLE OF CONTENTS

Section 1 • Abstracts

Subject Categories

Abstracts in the bibliography are grouped under the following categories:

01 Aerodynamics
Includes aerodynamics of bodies, combinations, internal flow in ducts and turbomachinery; wings, rotors, and control surfaces. For applications see: 02 Aircraft and 32 Space Vehicles. For related information see also: 02 Aircraft; 10 Electronics; and 21 Navigation.

02 Aircraft
Includes fixed-wing airplanes, helicopters, gliders, balloons, ornithopters, etc.; and specific types of complete aircraft (e.g., ground effect machines, STOL, and VTOL); flight tests; operating problems (e.g., sonic boom); safety and safety devices; economics; and stability and control. For basic research see: 01 Aerodynamics. For related information see also: 31 Space Vehicles; and 32 Structural Mechanics.

03 Auxiliary Systems
Includes fuel cells, energy conversion cells, and solar cells; auxiliary gas turbines; hydraulic, pneumatic and electrical systems; actuators; and inverters. For related information see also: 09 Electronic Equipment; 22 Nuclear Engineering; and 28 Propulsion Systems.

04 Biosciences
Includes aerospace medicine, exobiology, radiation effects on biological systems; physiological and psychological factors. For related information see also: 05 Biotechnology.

05 Biotechnology
Includes life support systems, human engineering, protective clothing and equipment; crew training and evaluation, and piloting. For related information see also: 04 Biosciences.

06 Chemistry
Includes chemical analysis and identification (e.g., spectroscopy). For applications see: 17 Materials, Metallic; 18 Materials, Nonmetallic; and 27 Propellants.

07 Communications
Includes communications equipment and techniques, noise; radio and communications blackout; modulation telemetry; tracking radar and optical observation; and wave propagation. For basic research see: 23 Physics, General; and 21 Navigation.

08 Computers
Includes computer operation and programming; and data processing. For applications, see specific categories. For related information see also: 19 Mathematics.

09 Electronic Equipment
Includes electronic test equipment and maintainability; component parts, e.g., electron tubes, tunnel diodes, transistors, integrated circuitry; microminiaturization. For basic research see: 10 Electronics. For related information see also: 07 Communications and 21 Navigation.

10 Electronics
Includes circuit theory; and feedback and control theory. For applications see: 09 Electronic Equipment. For related information see specific Physics categories.

11 Facilities, Research and Support
Includes airports; lunar and planetary bases including associated vehicles; ground support systems; related logistics; simulators; test facilities (e.g., rocket engine test stands, shock tubes, and wind tunnels); test ranges; and tracking stations.

12 Fluid Mechanics
Includes boundary-layer flow; compressible flow; gas dynamics; hydrodynamics; and turbulence. For related information see also: 01 Aerodynamics; and 33 Thermodynamics and Combustion.

13 Geophysics
Includes aeronomy; upper and lower atmosphere studies; oceanography; cartography; and geodesy. For related information see also: 20 Meteorology; 29 Space Radiation; and 30 Space Sciences.

14 Instrumentation and Photography
Includes design, installation, and testing of instrumentation systems; gyroscopes; measuring instruments and gages; recorders, transducers; aerial photography; and telescopes and cameras.

15 Machine Elements and Processes
Includes bearings, seals, pumps, and other mechanical equipment; lubrication, friction, and wear; manufacturing processes and quality control; reliability; drafting; and materials fabrication, handling, and inspection.

16 Masers
Includes applications of masers and lasers. For basic research see: 26 Physics, Solid-State.

17 Materials, Metallic
Includes cerments; corrosion; physical and mechanical properties of materials; metallurgy; and applications as structural materials. For basic research see: 06 Chemistry. For related information see also: 18 Materials, Nonmetallic; and 32 Structural Mechanics.
18 Materials, Nonmetallic
Includes corrosion; physical and mechanical properties of materials (e.g., plastics); and elastomers, hydraulic fluids, etc. For basic research see: 06 Chemistry. For related information see also: 17 Materials, Metallic; 27 Propellants; and 32 Structural Mechanics.

19 Mathematics
Abstracts
Includes calculation methods and theory; and numerical analysis. For applications see specific categories. For related information see also: 08 Computers.

20 Meteorology
Abstracts
Includes climatology; weather forecasting; and visibility studies. For related information see also: 13 Geophysics; and 30 Space Sciences.

21 Navigation
Includes guidance; autopilots; star and planet tracking; inertial platforms; and air traffic control. For related information see also: 07 Communications.

22 Nuclear Engineering
Abstracts
Includes nuclear reactors and nuclear heat sources used for propulsion and auxiliary power. For basic research see: 24 Physics, Atomic, Molecular, and Nuclear. For related information see also: 03 Auxiliary Systems; and 28 Propulsion Systems.

23 Physics, General
Abstracts
Includes acoustics, cryogenics, mechanics, and optics. For astrophysics see: 30 Space Sciences. For geophysics and related information see also: 13 Geophysics; 20 Meteorology; and 29 Space Radiation.

24 Physics, Atomic, Molecular, and Nuclear
Abstracts
Includes atomic, molecular and nuclear physics. For applications see: 22 Nuclear Engineering. For related information see also: 29 Space Radiation.

25 Physics, Plasma
Includes magnetohydrodynamics. For applications see: 28 Propulsion Systems.

26 Physics, Solid-State
Includes semiconductor theory; and superconductivity. For applications see: 16 Masers. For related information see also: 10 Electronics.

27 Propellants
Includes fuels; igniters; and oxidizers. For basic research see: 06 Chemistry; and 33 Thermodynamics and Combustion. For related information see also: 28 Propulsion Systems.

28 Propulsion Systems
Abstracts
Includes air breathing, electric, liquid, solid, and magnetohydrodynamic propulsion. For nuclear propulsion see: 22 Nuclear Engineering. For basic research see: 23 Physics, General; and 33 Thermodynamics and Combustion. For applications see: 31 Space Vehicles. For related information see also: 27 Propellants.

29 Space Radiation
Abstracts
Includes cosmic radiation; solar flares; solar radiation; and Van Allen radiation belts. For related information see also: 13 Geophysics; and 24 Physics, Atomic, Molecular, and Nuclear.

30 Space Sciences
Abstracts
Includes astronomy and astrophysics; cosmology; lunar and planetary flight and exploration; and theoretical analysis of orbits and trajectories. For related information see also: 11 Facilities; Research and Support; and 31 Space Vehicles.

31 Space Vehicles
Includes launch vehicles; manned space capsules; clustered and multistage rockets; satellites; sounding rockets and probes; and operating problems. For basic research see: 30 Space Sciences. For related information see also: 28 Propulsion Systems; and 32 Structural Mechanics.

32 Structural Mechanics
Includes structural element design and weight analysis; fatigue; thermal stress; impact phenomena; vibration; flutter; inflatable structures; and structural tests. For related information see also: 17 Materials, Metallic; and 18 Materials, Nonmetallic.

33 Thermodynamics and Combustion
Includes ablation, cooling, heating, heat transfer, thermal balance, and other thermal effects; and combustion theory. For related information see also: 12 Fluid Mechanics; and 27 Propellants.

34 General
Abstracts
Includes information of a broad nature related to industrial applications and technology; and basic research; defense aspects; information retrieval management; law and related legal matters; and legislative hearings and documents.

Section 2 • Indexes

SUBJECT INDEX
INVENTOR INDEX
SOURCE INDEX
NUMBER INDEX
ACCESSION NUMBER INDEX
AERODYNAMICS

Includes aerodynamics of bodies, combinations, internal flow in ducts and turbomachinery; wings, rotors, and control surfaces. For applications see: 02 Aircraft and 31 Space Vehicles. For related information see also: 12 Fluid Mechanics; and 33 Thermodynamics and Combustion.

SINGLE WING SUPERSONIC AIRCRAFT Patent Application
Robert T. Jones, inventor (to NASA) Filed 12 Aug. 1974
40 p
(NASA-Case-ARC-10470-3; US-Patent-Apply-SN-496779) Avail:
NTIS HC $5.00 CSCL 01C

An aircraft is described, having a single fuselage with a main wing and a horizontal stabilizer airfoil pivotally attached at their centers to the fuselage. The pivotal attachments allow the airfoils to be yawed relative to the fuselage for high speed flight, and to be positioned at right angles with respect to the fuselage during takeoff, landing, and low speed flight. The main wing and the horizontal stabilizer are upwardly curved from their center pivotal connections towards their ends to form curvilinear dihedrals.
02 AIRCRAFT

Includes fixed-wing airplanes, helicopters, gliders, balloons, ornithopters, etc.; and specific types of complete aircraft (e.g., ground effect machines, STOL and VTOI); flight tests; operating problems (e.g., sonic boom); safety and safety devices; economics; and stability and control. For basic research see: 01 Aerodynamics. For related information see also: 31 Space Vehicles; and 32 Structural Mechanics.

N74-26456* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va. WINGTIP VORTEX DISSIPATOR FOR AIRCRAFT Patent Application

An apparatus for reducing the effects of aircraft wingtip vortices is discussed. The device consists of a spline structure containing hinged and retractable flat plates which create a positive pressure gradient in the area downstream of the wing trailing edge. This positive pressure gradient causes the vortex to dissipate by forcing the linear air flow around and through the core of the vortex. Alternate configurations in the form of a drag chute or a wingtip mounted engine are considered. NASA

N74-30421* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va. DEPLOYABLE FLEXIBLE VENTRAL FINS FOR USE AS AN EMERGENCY SPIN RECOVERY DEVICE IN AIRCRAFT Patent

A flexible fin device for mounting on an aircraft to effect spin recovery is described. The device may be selectively deployed to provide a triangular planform of flexible material to provide spin recovery, and retracted for compact storage during non-use. A single flexible fin may be deflected in a specific direction depending on direction of spin rotation, or two flexible fins forming an inverted V configuration may be used. The device is mounted on the underbody of the aircraft.

Official Gazette of the U.S. Patent Office

N74-27490* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio. JET EXHAUST NOISE SUPPRESSOR Patent

Noise suppression for a jet engine exhaust is provided by an annular divergent body attached to an exhaust nozzle. The smallest diameter of the divergent body is larger than the diameter of the exhaust nozzle exit to form an annular step which produces a shock wave in the exhaust as it passes the step. An annular shroud is disposed around the divergent body and causes outside air to pass through voids in the divergent body to mix with the jet exhaust gas. The divergent body includes a plurality of channels with separators between the channels.

Official Gazette of the U.S. Patent Office
A tuned noise suppressor is described consisting of annular acoustically porous elements for incorporation into the inlet and exhaust ducts of turbofan engines. The apparatus uses sound wave absorption, reflection, and incompatibility for achieving high noise reduction in the short distance. In addition, it has a duct of uniform inner diameter which does not block the duct flow.

Improved stability is provided in a hingeless helicopter rotor by inclining the principal elastic flexural axes and coupling pitching of the rotor blade with the lead-lag bending of the blade. The primary elastic flex axes can be inclined by constructing the blade of materials that display nonuniform stiffness. The specification describes various cross section distributions and the inclined flex axes resulting therefrom. Also described are arrangements for varying the pitch of the rotor blade in a predetermined relationship with lead-lag bending of the blade, i.e., bending of the blade in a plane parallel to its plane of rotation.

The aerodynamic configuration of a swept back aircraft wing for alleviating the wake-vortex hazard behind the aircraft is discussed. The airflow behind the wing is altered by deployment of segmented flaps to produce tailored span loading. Sawtooth span loading is used to generate a translating sheet of air flow energy which develops several unequal vortex pairs which break up the turbulent wake. Diagrams of the wing planforms and the resulting wake distribution are provided.
03 AUXILIARY SYSTEMS

Includes fuel cells, energy conversion cells, and solar cells; auxiliary gas turbines, hydraulic, pneumatic and electrical systems; actuators; and inverters. For related information see also: 09 Electronic Equipment; Nuclear Engineering; and 28 Propulsion Systems.


BATTERY TESTING DEVICE Patent

A battery testing device is described for testing the cells of a multiple-cell battery, the battery having a cover plate with access holes to provide access to the connecting straps between cells. A panel of probe assembly receiving holes is located to correspond to the location of the access holes when the panel is positioned on top of the battery. A probe assembly is positioned within each probe assembly receiving hole, with a spring biased electrically conductive plunger to make electrical contact with the connecting strap through the corresponding access hole when the panel is pushed towards the top of the battery.

Official Gazette of the U.S. Patent Office


FLAME DETECTOR OPERABLE IN PRESENCE OF PROTON RADIATION Patent

A detector of ultraviolet radiation for operation in a space vehicle which orbits through high intensity radiation areas is described. Two identical ultraviolet sensor tubes are mounted within a shield which limits to acceptable levels the amount of proton radiation reaching the sensor tubes. The shield has an opening which permits ultraviolet radiation to reach one of the sensing tubes. The shield keeps ultraviolet radiation from reaching the other sensor tube, designated the reference tube. The circuitry of the detector subtracts the output of the reference tube from the output of the sensing tube, and any portion of the output of the sensing tube which is due to proton radiation is offset by the output of the reference tube. A delay circuit in the detector prevents false alarms by keeping statistical variations in the proton radiation sensed by the two sensor tubes from developing an output signal.

Official Gazette of the U.S. Patent Office

N74-29416* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

ELECTROLYTIC CELL DESIGN Patent Application

An electrolytic cell is made up of a stack of polysulfone plates faced with sheets of platinum bonded by silicone rubber and mechanically secured to their plates by Teflon screws having heads serving as spacers between opposed platinum sheets.

NASA
A Schottky barrier solar cell is described which consists of a layer of wide band gap semiconductor material on which a very thin film of semi-transparent metal is deposited to form the barrier. The layer of the wide band gap semiconductor material is on top of a layer of narrower band gap semiconductor material, to which one of the cell's contacts may be attached directly, or through a substrate. The cell's other contact is a grid structure which is deposited on the thin metal film.
04 BIOSCIENCES

Includes aerospace medicine, exobiology, radiation effects on biological systems; physiological and psychological factors. For related information see also: 05 Biotechnology.

N74-26619# National Aeronautics and Space Administration.
Goddard Space Flight Center, Greenbelt, Md.

IMPROVED METHOD OF DETECTING AND COUNTING BACTERIA Patent Application
Grace L. Picciolo and Emmett W. Chappelle, inventors (to NASA)
Issued 31 May 1974 20 p
(NASA-Case-GSC-11917-1; US-Patent-Appl-SN-475337) Avail:
NTIS HC $4.00 CSCL 06M

A method for bacteria counting and detection is described. The problems solved by the equipment are identified as: (1) the lack of recognition that a quantity of nonbacterial ATP was bound to large molecules of particulate matter and would not be destroyed by apyrase unless freed, as in this case by a suitable buffer such as malic acid and (2) the sensitivity or lack of capability of a system to detect and count low bacteria levels. The solution was to concentrate the sample, by centrifuging for example, so that the ATP would effectively stand apart from the supernatant phase.

N74-32518# National Aeronautics and Space Administration.
Langley Research Center, Langley Station, Va.

MEASUREMENT OF GAS PRODUCTION OF MICROORGANISMS Patent Application
Judd R. Wilkins, Stacey M. Mills, and Albin O. Pearson, inventors (to NASA) Filed 24 Jul. 1974 20 p
(NASA-Case-LAR-11326-1; US-Patent-Appl-SN-491416) Avail:
NTIS HC $4.00 CSCL 06M

A simple apparatus and method are disclosed for measuring gas production by microorganisms using a pressure transducer to sense pressure built-up by members of the ENTEROBACTER-ACEAE group of bacteria. The test system consists of a 5.0 psid pressure transducer and a pressure equalizer valve attached to the metal cap of a 20 x 150 mm test tube with gas pressure being recorded on a strip chart recorder.

NASA
05 BIOTECHNOLOGY

Includes life support systems, human engineering, protective clothing and equipment; crew training and evaluation, and piloting. For related information see also: 04 Biosciences.


A programmable physiological infusion device and method are provided wherein a program source, such as a paper tape, is used to actuate an infusion pump in accordance with a desired program. The system is particularly applicable for dispensing calcium in a variety of waveforms.

Official Gazette of the U.S. Patent Office


A Korotkov sound processor, used in a noninvasive automatic blood measuring system where the brachial artery is occluded by an inflatable cuff, is disclosed. The Korotkoff sound associated with the systolic event is determined when the ratio of the absolute value of a voltage signal, representing Korotkov sounds in the range of 18 to 26 Hz to a maximum absolute peak value of the unfiltered signals, first equals or exceeds a value of 0.45. Korotkov sound associated with the diastolic event is determined when a ratio of the voltage signal of the Korotkov sounds in the range of 40 to 60 Hz to the absolute peak value of such signals within a single measurement cycle first falls below a value of 0.17. The processor signals the occurrence of the systolic and diastolic events and these signals can be used to control a recorder to record pressure values for these events.

Official Gazette of the U.S. Patent Office


A miniature multichannel biotelemeter system is described. The system includes a transmitter where signals from different sources are sampled to produce a wavetrain of pulses. The transmitter also separates signals by sync pulses. The pulses amplitude modulate a radio frequency carrier which is received at a receiver unit. There the sync pulses are detected by a demultiplexer which routes the pulses from each different source to a separate output channel where the pulses are used to reconstruct the signals from the particular source.

Official Gazette of the U.S. Patent Office
An arterial pulse wave pressure transducer is introduced. The transducer is comprised of a fluid filled cavity having a flexible membrane disposed over the cavity and adapted to be placed on the skin over an artery. An arterial pulse wave creates pressure pulses in the fluid which are transduced, by a pressure sensitive transistor in direct contact with the fluid, into an electric signal. The electrical signal is representative of the pulse waves and can be recorded so as to monitor changes in the elasticity of the arterial walls.

A flexible joint for a pressurizable garment is described which has two fabric layers bonded together. The lay of one layer is straight cut and the other of bias cut. A ring-like tension member covered with Teflon disposed at the minor diameter of each joint convolution, is unrestrained other than being retained in the flexure plane. A compression ring is secured at the major diameter, at certain of the convolutions, preferably alternate ones. A pair of axially disposed cable joint restraints at the convolution periphery are disposed in a plane normal to the flexure plane.
A raw sewage treatment process is disclosed in which substantially all the non-dissolved matter, suspended in the sewage water, is first separated from the water, in which at least organic matter remains dissolved. The non-dissolved material is pyrolyzed to form an activated carbon and ash material without the addition of any conditioning agents. The activated carbon and ash material is added to the water from which the non-dissolved matter was removed. The activated carbon and ash material adsorbs the organic matter dissolved in the water and is thereafter supplied in a counter flow direction and combined with the incoming raw sewage to at least facilitate the separation of the non-dissolved settleable materials from the sewage water. Carbon and ash material together with the non-dissolved matter which was separated from the sewage water are pyrolyzed to form the activated carbon and ash material.
CHEMISTRY

Includes chemical analysis and identification (e.g. spectroscopy). For applications see: 17 Materials, Metallic; 18 Materials, Nonmetallic; and 27 Propellants.

ETHER-LINKED ARYL TETRACARBOXYLIC DIANHYDRIDES Patent Application
(NASA-Case-MFS-22356-1; US-Patent-AppI-SN-489008) Avail: NTIS HC $4.00 CSCL 07C
Dianhydrides were found which when reacted with diamines provide polyimides that exhibit good tensile strength, and excellent thermal, oxidative, and hydrolytic stability. These characteristics make the polyimides useful as sealants in advanced aerospace structures. A formula for the dianhydrides is given and a method for their preparation is presented. NASA

POLYIMIDES OF ETHER-LINKED ARYL TETRACARBOXYLIC DIANHYDRIDES Patent Application
James A. Webster, inventor (to NASA) (Monsanto Res. Corp.) Issued 11 Jul. 1974 19 p Sponsored by NASA
(NASA-Case-MFS-22355; US-Patent-AppI-SN-487852) Avail: NTIS HC $4.00 CSCL 07C
Polyimides with chemical and physical properties that make them useful as sealants in advanced aerospace structures are presented. The polyimides also have high levels of thermal, oxidative, and hydrolytic stability. NASA

N74-30502* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PRODUCTION OF PURE METALS Patent
A process for depositing elements by irradiating liquids is reported. Ultra pure elements are precipitated from aqueous solutions or suspensions of compounds. A solution of a metal to be prepared is irradiated, and the insoluble reaction product settles out. Some chemical compounds may also be prepared in this manner. Official Gazette of the U.S. Patent Office

Aromatic nitrile compounds, aromatic nitrile-modified (terminated and/or appended) imide, benzimidazole, imidazopyrrole, and quinoxaline prepolymers, and aromatic dinitrile compounds were trimerized by heating to a temperature in the range of from about 100 °C to about 700 °C, and preferably in the range of from about 200 °C to about 350 °C, in the presence of a catalyst or mixture of catalysts selected from one or more of the following groups: (1) organic sulfonic and sulfonic acids; (2) organic phosphonic and phosphinic acids; and (3) metallic acetylacetonates. The process occurs at a pressure range of from about atmospheric pressure to about 10,000 p.s.i., and preferably in the range of from about 200 p.s.i. to about 750 p.s.i. The catalytic trimerization process is carried out in the presence of reinforcing filler material. The particular catalysts, moderate temperatures, and pressures employed in the trimerization process, and the processable filler-reinforced composites and polymers produced thereby, exhibit good thermal-oxidative stability and high performance structural properties at elevated temperatures. Author
07 COMMUNICATIONS

Includes communications equipment and techniques; noise; radio and communications blackout; modulation telemetry; tracking radar and optical observation; and wave propagation. For basic research see: 23 Physics. General; and 21 Navigation.

N74-22814* National Aeronautics and Space Administration. Pasadena Office, Calif.
HIGH ISOLATION RF SIGNAL SELECTION SWITCHES Patent
A selection switch with high isolation between RF signal input terminals is achieved with a gated Schmitt trigger circuit feeding into a control NAND gate in each signal switching channel. The control NAND gates of the separate signal channels are coupled to an output terminal by a single NAND gate. The Schmitt trigger circuits and all gates are implemented with Schottky transistor-transistor logic circuits having input clamping diodes. Each Schmitt trigger circuit includes two cascaded NAND gates and a feedback isolation Schottky diode between one input terminal connected to receive an RF input and another input terminal connected to receive a feedback signal from the second of the two cascaded NAND gates. Both NAND gates of the Schmitt trigger circuits are enabled by the same switch control signal which enables the control gates.
Official Gazette of the U.S. Patent Office

N74-2654* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DIFFERENTIAL PHASE SHIFT KEYED COMMUNICATION SYSTEM Patent
A communication system using differential phase-shift-keying (DPSK) transmits and receives binary data without requiring timing or phase reference signals. The system encodes and modulates the data at the transmitter, and decodes and demodulates the data at the receiver, without ambiguity as to the data content. Official Gazette of the U.S. Patent Office

N74-22827* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
POLARIZATION COMPENSATOR FOR OPTICAL COMMUNICATIONS Patent Application
An optical data communication system is reported whereby two orthogonal polarization states of a light beam carrier correspond to digital states. In such a system, automatic polarization compensation is provided by applying a dither modulating voltage to a cell exhibiting the electrooptic effect. The cell controls the relative phase of electric field components of an input light beam enabling the dither frequency component of the difference of the instantaneous powers in the two polarization states to be coherently detected. A signal derived from the coherent detection process is fed back to the cell via an integrator to form a polarization bias compensating, servo loop.

NASA
A method for conditioning, and thus enabling retrieval of intelligence from, magnetic tapes after damage from heat has caused the tape to wrinkle and curl severely thereby reducing tape width to less than one-half its original size. The damaged tape is superposed on a first piece of splicing tape with the oxide side of the magnetic tape in contact with the adhesive side of the splicing tape and then carefully smoothed by a special tool. A second piece of splicing tape is placed on the backing side of the magnetic tape then the resulting tape stack is trimmed to the original width of the magnetic tape. After the first piece of splicing tape is carefully removed from the oxide side of the damaged magnetic tape, the resulting magnetic tape is then ready to be placed into a recorder for playback.

A digital communication system is reported for parallel operation of 16 or more transceiver units with the use of only four interconnecting wires. A remote synchronization circuit produces unit address control words sequentially in data frames of 16 words. Means are provided in each transceiver unit to decode calling signals and to transmit calling and data signals. The transceivers communicate with each other over one data line. The synchronization unit communicates the address control information to the transceiver units over an address line and further provides the timing information over a clock line. A reference voltage level or ground line completes the interconnecting four wire hookup.

The concept of nonlinear coherence employed in carrier tracking to improve telecommunications efficiency is disclosed. A generic tracking loop for a coherent receiver is shown having seven principle feedback signals which may be selectively added and applied to a voltage controlled oscillator to produce a reference signal that is phase coherent with a received carrier. An eighth feedback signal whose nonrandom components are coherent with the phase detected and filtered carrier may also be added to exploit the sideband power of the received signal. A ninth feedback signal whose nonrandom components are also coherent with the quadrature phase detected and filtered carrier could be additionally or alternatively included in the composite feedback signal to the voltage controlled oscillator.
APPARATUS FOR SIMULATING OPTICAL TRANSMISSION LINKS Patent Application

A space-to-space or space-to-earth optical transmission link is simulated by positioning a linear optical modulator between an optical carrier source and a receiver for the carrier. The optical modulator is driven by an analog signal having random variations indicative of characteristics of the transmission link, as derived from an analog computer circuit. The analog computer circuit is responsive to a Gaussian random analog source. For certain types of links, the analog computer circuit is responsive to a pair of Gaussian analog signals which are derived by feeding a relatively wide band Gaussian analog source in parallel to a first low pass filter and to a heterodyne circuit. For space-to-space transmission, transmitter pointing jitter is a dominant noise source and is simulated by deriving a beta statistical variation from the analog computer.

METHOD AND APPARATUS FOR DECODING COMPATIBLE CONVOLUTIONAL CODES Patent

This invention relates to learning decoders for decoding compatible convolutional codes. The decoder decodes signals which have been encoded by a convolutional coder and allows performance near the theoretical limit of performance for coded data systems. The decoder includes a sub-bit shift register wherein the received sub-bits are entered after regeneration and shifted in synchronization with a clock signal recovered from the received sub-bit stream. The received sub-bits are processed by a sub-bit decision circuit, entered into a sub-bit shift register, decoded by a decision circuit, entered into a data shift register, and updated to reduce data errors. The bit decision circuit utilizes stored sub-bits and stored data bits to determine subsequent data-bits. Data errors are reduced by using at least one update circuit.
07 COMMUNICATIONS

disclosed employs a two-camera television system with a field sequential multiplexer to provide the alternating images on a television screen. Another television embodiment uses a second solid state electro-optic shuttering device in conjunction with a single camera and range finder type optics to provide the alternating image signal.

NASA
08 COMPUTERS
Includes computer operation and programming; and data processing. For applications, see specific categories. For related information see also: 19 Mathematics.

An interface logic circuit permitting the transfer of information between two computers having asynchronous clocks is disclosed. The information transfer involves utilization of control signals (including request, return-response, ready) to generate properly timed data strobe signals. Noise problems are avoided because each control signal, upon receipt, is verified by at least two clock pulses at the receiving computer. If control signals are verified, a data strobe pulse is generated to accomplish a data transfer. Once initiated the data strobe signal is properly completed independently of signal disturbances in the control signal initiating the data strobe signal. Completion of the data strobe signal is announced by automatic turn-off of a return-response control signal.

Four classes of nonlinear nonsingular feedback shift registers (NLFSR) are disclosed. Each NLFSR, assumed to be r stages long, regardless of its class, generates a feedback sequence of length 2r is known. Each NLFSR of either class 1 or class 2 has a feedback arrangement which is a function of primitive polynomial of degree r-1. Each register of class 1 includes three nonlinear terms, each one of which is the AND function of a different combination of 0-1) outputs of the first (r-1) stages. Each register of class 2 includes a single nonlinear term which is the AND function of (r-1) outputs of the first (r-1) stages. Each NLFSR in class 3 has a feedback arrangement which is based on a primitive polynomial of degree r-2 and a unique single nonlinear term, while each NLFSR in class 4 has a feedback arrangement which is based on a primitive polynomial of degree r-3 and three nonlinear terms.

An analog-to-digital converters, finding particular application in a multichannel pulse height analyzer, with a means for digitizing the analog input in two conversion steps is presented. To digitize the input to 13 bits, a 7-bit digital to analog converter (DAC) with a 7-bit up-down counter is used. During the first conversion step which is a coarse conversion, the input V sub l, is compared with the DAC output, V sub L and the 7-bits of the counter are set by successive approximation. Thereafter, after settling, the DAC output is driven twice toward V sub l. The output of an amplifier of a gain 2 to the 7th power is stored after each charge of the DAC in one of two storage and hold circuits, depending on the polarity of the amplifier output. Then, the content of the 7-bit counter is transferred to the 7 higher order bits of a 14-bit buffer counter. The fine conversion step is performed by successive approximation.
09 ELECTRONIC EQUIPMENT

Includes electronic test equipment and maintainability; component parts, e.g., electron tubes, tunnel diodes, transistors; integrated circuitry; microminiaturization. For basic research see: 10 Electronics. For related information see also: 07 Communications and 21 Navigation.

N74-21850* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

IMAGE TUBE Patent

An optical image is projected onto a planar surface of a photocathode that derives an electron beam replica of the image. A target electrode displaced relative to the photocathode so that it does not obstruct the optical image includes a planar surface for receiving and deriving an accurate replica of the electron beam image. The two planar surfaces are parallel. The electron beam image is focused on the target electrode by providing throughout a region that extends between the planar surfaces of the photocathode and receiving electrode, constant homogeneous dc electric and magnetic fields. The electric field extends in a direction perpendicular to the planar surfaces while the magnetic field extends along a straight line that intersects the photocathode and target electrode at an acute angle.

N74-21851* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

BIO-ISOLATED dc OPERATIONAL AMPLIFIER Patent

A bio-isolated dc operational amplifier is described for use in making bioelectrical measurements of a patient while providing isolation of the patient from electrical shocks. The circuit contains a first operational amplifier coupled to the patient with its output coupled in a forward loop through a first optic coupler to a second operational amplifier. The output of the second operational amplifier is coupled to suitable monitoring circuitry via a feedback circuit including a second optic coupler to the input of the first operational amplifier.


METHOD OF DETERMINING BOND QUALITY OF POWER TRANSISTORS ATTACHED TO BED SUBSTRATES Patent Applications

A non destructive method is reported for testing the bond quality of transistor heat sink bonds by X-ray examination of the bond. The bond is X-ray photographed and the photograph is subjected to analysis by a light meter system to determine the percentage of voids in the bond. Void areas approaching 20% of the bond area can be tolerated if they are scattered. For repeatable results, X-ray of identical assemblies must be taken at identical machine settings. Since it is possible for lack of bonding not to show on an X-ray if the molten preform has conformed exactly to the bottom of the chip, the zing test for wetting should be used in conjunction with the X-ray test. NASA
A Class D amplifier is reported for the amplification of signals having uni-polar or bi-polar direct current, or alternating current. The device contains positive and negative signal channels and includes a transformer coupled output circuit for each channel with a switching circuit which effects isolation of the non-operating channel from the operating channel as a function of signal polarity.
to the high voltage power supply while the remaining washers are integrally connected to the circuits requiring the high voltage.


LC-Oscillator With Automatic Stabilized Amplitude Via Bias Current Control Patent

A stable excitation supply for measurement transducers is described. It consists of a single-transistor oscillator with a coil connected to the collector and a capacitor connected from the collector to the emitter. The output of the oscillator is rectified and the rectified signal acts as one input to a differential amplifier; the other input being a reference potential. The output of the amplifier is connected at a point between the emitter of the transistor and ground. When the rectified signal is greater than the reference signal, the differential amplifier produces a signal of polarity to reduce bias current and, consequently, amplification.

N74-27683* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

High Current Electrical Lead Patent

An electrical lead has insulators imbedded in an inner conductor rod to form an annulus between the rod and a surrounding outer sheath. This annular space is filled with gas which conducts heat and prevents electrical leakage.
A brushless dc motor is disclosed in which the rotor is an electromagnet energized through a transformer having its primary winding stationary on the stator, and its secondary winding mounted on the rotor. Controlled dc current applied to the motor is converted to ac current for inductive coupling to the rotating secondary winding. The ac current in the secondary winding is rectified to provide dc current to the rotor field coil.

A dichroic plate is disclosed for passing radiation within a particular frequency band and reflecting radiation outside of that frequency band. The value of the thickness of the plate is selected so that the plate acts as a resonant narrow band pass filter for the desired pass frequency, and the shapes of the apertures in the dichroic plate are selected to compensate for the phase shift caused by the air plate interface presented to the signals passing therethrough.

A transmission line is reported for improving the sensitivity of a maser or other microwave processing equipment. A cooled coaxial line is used for coupling a waveguide to a refrigerated maser, wherein the central coaxial conductor has an outer end projecting into the waveguide and is covered by a quartz dome. The space between the central and outer conductors of the coaxial line is evacuated to minimize heat transfer. The central coaxial conductor is supported by the outer conductor at only its inner end which is refrigerated to less than 5 deg Kelvin. The central coaxial conductor is a short solid copper rod to maintain even the outer end at a low temperature.
The development of a corrugated horn antenna in which the corrugated surfaces of the antenna are formed by V-shaped slots was reported. The depth of the slots is between 0.3125 and 0.625 wavelengths. For this range of depths the surface impedance is capacitive and operates in a cut-off mode. The V-shaped corrugated slots are more easily machined than previous slots and the resulting antenna is readily adaptable to unfurlable antennas for space applications.

High efficiency, multi-dimensional thin film vacuum tubes suitable for use in high temperature, high radiation environments are described. The tubes are fabricated by placing, as by photolithographic techniques, such as are used in solid state integrated circuits, thin film electrode members in selected arrays on facing interior wall surfaces of an alumina substrate envelope. Cathode members are formed using thin films of triple carbonate. The photoresist used in photolithography aids in activation of the cathodes by carbonizing and reacting with the reduced carbonates when heated in vacuum during forming. The finely powdered triple carbonate is mixed with the photoresist used to delineate the cathode locations in the conventional solid state photolithographic manner. Upon high temperature forming (1000°C) the barium, etc. is formed at the surface. Anode and grid members are formed using thin films of refractory metal.

A negative resistance parametric amplifier is reported that employs a discrete varactor diode for high frequency pump excitation in the millimeter wave range.
A double parabolic cylinder antenna is reported that has telescoping sections on the main reflector and sub-reflector to provide continuous bidirectional zooming of a beam. By positioning a monopulse feed within the Airy disc and rotating the feed to compensate for changes in the geometry of the antenna during zooming, bidirectional zooming capability in monopulse radar is achieved.

An improved free-running dc regulator with feedforward control, is disclosed. The feedforward control functions to maintain the frequency of the dc regulator substantially constant by varying the duty ratio in inverse proportion to changes in the source voltage being regulated.

Problems of magnetization and self-field instability in composite electrical superconductors are reduced or eliminated by an improved method for transposition of the filaments within the conductor. The method includes, as a first step, forming a composite strand by embedding superconductive filaments within a non-superconductive matrix. Filaments are arranged substantially parallel to the longitudinal axis of the conductor and form a linear, closed geometric figure, such as a circle or square, in cross section. A twist is then imparted to the strand to transpose the filaments around the axis of the strand in a substantially helical path. A plurality of strands so produced are combined within an elongate non-superconductive matrix and arranged so that the strands are substantially parallel to the longitudinal axis of the matrix and form a linear closed figure. A twist is then imparted to the conductor so that each filament within the conductor is thus transposed along the axis of the conductor, and follows a modified helical path.
Sections are cut from a SiC platelet such that the sections have a-faces parallel to the c-axis of the SiC platelet. The sections serve as substrates for the growth of SiC layers by attaching the substrates to a body which is then placed in a chamber and the chamber evacuated. Hydrogen is then admitted, and the body on which the substrates are mounted is heated to produce a temperature profile such that the subsequent admission of a carbon containing chlorosilane gas or a mixture of a chlorosilane gas and a hydrocarbon gas will cause free silicon to be deposited at one end of the body while SiC crystals grow on the substrates which are in a preferred temperature range. Dopant gases, either p-type or n-type, can be admitted with the chlorosilane or hydrocarbon gas to produce the desired type of semiconductor.

A gyrator circuit is described which is of the conventional configuration of two amplifiers in a circular loop, one producing zero phase shift and the other producing 180° phase reversal, in a circuit having medium Q composed of all field effect transistors of the same conductivity type. The current source to each gyrator amplifier comprises an amplifier which responds to changes in current, with the amplified signals feedback so as to limit current. The feedback amplifier has a large capacitor connected to bypass high frequency components, thereby stabilizing the output. The design makes possible fabrication of circuits with transistors of only one conductivity type, providing economies in manufacture and use.

A switchable beamwidth antenna includes a concave parabolic main reflecting dish which has a central circular region and a surrounding coaxial annular region. A feed means selectively excites only the central region of the main dish via a truncated subreflector for wide beamwidth or substantially the entire main dish for narrow beamwidth. The feed means comprises a truncated concave ellipsoid subreflector and separate feed terminations located at two foci of the ellipsoid. One feed termination directly views all of the main dish while the other feed termination, exciting the main dish via the subreflector, excites only the central region because of the subreflector truncation.
10 ELECTRONICS

Includes circuit theory and feedback and control theory. For applications see: 09 Electronic Equipment. For related information see specific Physics categories.

N74-22885* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LOW DISTORTION AUTOMATIC PHASE CONTROL CIRCUIT Patent
A voltage controlled phase shifter is rendered substantially harmonic distortion free over a large dynamic input range by employing two oppositely poled, equally biased varactor diodes as the voltage controlled elements which adjust the phase shift. Control voltages which affect the bias of both diodes equally are used to adjust the phase shift without increasing distortion. A feedback stabilized phase shifter is rendered substantially frequency independent by employing a phase detector to control the phase shift of the voltage controlled phase shifter.

Official Gazette of the U.S. Patent Office

N74-27705* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DIFFERENTIAL PHASE SHIFT KEYED SIGNAL RESOLVER Patent
A differential phase shift keyed signal resolver resolves the differential phase shift in the incoming signal to determine the data content thereof overcoming phase uncertainty without requiring a transmitted reference signal.

Official Gazette of the U.S. Patent Office

N74-26760* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DIODE QUAD TRANSDUCER AND DISCRIMINATOR CIRCUIT Patent Application
An electrical measuring apparatus consisting of a transducer and discriminator circuits using a four terminal circulating diode bridge is discussed. The bridge is used in combination with various impedance elements to produce an output signal which is proportional to a relationship between at least two of the impedance elements. Advantages of the circuit over previous similar devices are described. Diagrams of the circuit are provided.

NASA

N74-32711* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PULSE STRETCHER FOR NARROW PULSES Patent

NASA
A pulse stretcher for narrow pulses is presented. The stretcher is composed of an analog section for processing each arriving analog pulse and a digital section with logic for providing command signals to the gates and switches in the analog section.

Official Gazette of the U.S. Patent Office
11 FACILITIES, RESEARCH AND SUPPORT

Includes airports; lunar and planetary bases including associated vehicles; ground support systems; related logistics; simulators; test facilities (e.g., rocket engine test stands, shock tubes, and wind tunnels); test ranges; and tracking stations.

N74-26767* National Aeronautics and Space Administration. Pasadena Office, Calif.

DISPENSING TARGETS FOR ION BEAM PARTICLE GENERATORS Patent

A target for dispensing high energy protons or neutrons or ionized atoms or ionized molecules is provided which comprises a container for the target gas, which is at atmospheric or higher pressure. The container material can release the target gas in the spot where the container is heated above a predetermined temperature by the impact of an ion beam where protons or neutrons are desired, or by electrons where ionized atoms or molecules are desired. On the outside of the container, except for the region where the beam is to impact, there is deposited a layer of a metal which is imperious to gaseous diffusion. A further protective coating of a material is placed over the layer of metal, except at the region of the ion impact area in order to adsorb or unreacted gas in the vacuum in which the target is placed, thereby prevent reduction of the high vacuum, as well as contamination of the interior of the vacuum chamber.

Official Gazette of the U.S. Patent Office

N74-32718* National Aeronautics and Space Administration.

VEHICLE SIMULATOR BINOCULAR MULTIPLANAR VISUAL DISPLAY SYSTEM Patent Application

An aircraft simulator is described for affording practice in landing maneuvers and the like. A cathode ray tube (CRT) produces an image corresponding to the runway which image changes in response to the trainee's manipulation of controls. The CRT image is projected along an optical path to a screen that is visually accessible to the trainee. Interposed in the optical path are optical elements such as mirrors which are spaced from one another along the optical path so as to create virtual images on the screen that appear to be at different distances from the trainee. The optical elements are sequentially interposed in the path. Means are provided for synchronizing the production of the CRT image with one of the optical elements so that the image on the screen appears to the trainee to have a range corresponding to the environment being simulated by the CRT image. NASA

N74-30597* National Aeronautics and Space Administration.

APPARATUS FOR APPLYING SIMULATOR g-FORCES TO AN ARM OF AN AIRCRAFT SIMULATOR PILOT Patent

A device to be used with an aircraft simulator to apply positive and negative g forces to the pilot's arm is described. An arm harness fits around the arm which the pilot uses to operate the throttle. The device allows the harness to track intentional arm movements without exerting any restraining forces, and at the same time, applies g forces to the pilot's arm which are recorded by the aircraft simulator computer.

Official Gazette of the U.S. Patent Office
A neutron emitting target is used for neutron generating. A deuteron source and an accelerator vacuum chamber comprise a tritium-containing target layer, a deuteron accumulation layer, and a target support containing passages providing communication between the accumulation layer and portions of the surface. With this arrangement, deuterons passing through the target layer and implanting in and diffusing through the accumulation layer, diffuse into the communication passages and are returned to the accelerator vacuum chamber.

This invention is a tubular shaped guideway for high-speed air-cushioned supported vehicles. The tubular guideway is split and separated such that the sides of the guideway are open. The upper portion of the tubular guideway is supported above the lower portion by truss-like structural members. The lower portion of the tubular guideway may be supported by the terrain over which the vehicle travels, on pedestals or some similar structure.
12 FLUID MECHANICS

Includes boundary-layer flow; compressible flow; gas dynamics; hydrodynamics; and turbulence. For related information see also: 01 Aerodynamics; and 33 Thermo-dynamics and Combustion.

N74-25805* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

SHOCK POSITION SENSOR FOR SUPERSONIC INLETS Patent Application Miles O. Dustin, inventor (to NASA) Issued 30 May 1974 14 p

Static pressure taps or ports are provided in the throat of a supersonic inlet and signals indicative of the pressure at each of the ports is fed to respective comparators. Means is also provided for directing a signal indicative of the total throat pressure to the comparators. A periodic signal is superimposed on the total throat pressure so that the signal from the static pressure taps is compared to a varying scan signal rather than to total throat pressure only. This type of comparison causes each comparator to provide a pulse width modulated output which may vary from 0 percent time on to 100 percent time on. The pulse width modulated outputs of the comparators are summed, filtered and directed to a controller which operates a bypass valve such as a door whereby air is dumped from the inlet to prevent the shock wave from being expelled out the front.

NASA


A zero-g, constant flow electrophoretic separating apparatus is presented. The apparatus is composed a deflecting member to spread carrier fluid across a conduit, and an end wall with a valve located in the conduit past the separation electrodes from which layers of carrier and sample may be extracted. Electrode electrolyte is separated from the carrier and continually circulated and cleaned.

Official Gazette of the U.S. Patent Office


An apparatus for establishing a flow of fluid mass, such as gas, having a known velocity is introduced. The apparatus is characterized by an hermetically sealed chamber conforming to a closed-loop configuration and including a throat and a plurality of axially displaceable pistons for sweeping through the throat a stream of gas including a core and an uncheared boundary layer. Within the throat there is a cylindrical core body concentrically related to the throat for receiving the core, and a chamber surrounding the cylindrical body for drawing off the boundary layer, whereby the velocity of the core is liberated from the effects of the velocity of the boundary layer.

Official Gazette of the U.S. Patent Office
An apparatus for controlling fluids and gases in a zero gravity environment is described. The device consists of a circumnutating chamber which applies centrifugal force in separating gas from liquid. The liquid is forced by the circumnutating motion to travel in a path around the circular wall and periodically past a valve which drains off only the liquid. Gases are removed by a conduit which is protected from fluid droplets by baffles. The construction of the device makes it possible to eliminate seals between the moving parts of the system. P.N.F.

A centrifugal separator is described using a lyophobic filter for removing liquid particles from a mixed stream of gas and liquid under various negative or positive external acceleration conditions as well as zero g or weightless conditions. Rotating the lyophobic filter and inclining the filter to the entering flow improves the lyophobic properties of the filter, provides gross separation of larger liquid particles, and prevents prolonged contact of liquid droplets with the spinning filter which might change the filter properties or block the filter.

Official Gazette of the U.S. Patent Office
AN OPTICAL PROCESS FOR PRODUCING CLASSIFICATION MAPS FROM MULTISPECTRAL DATA

Richard E. Haskell, inventor (to NASA) (Oakland Univ.) Filed 30 Aug. 1974 29 p
(Grant NGR-23-054-006) (NASA-Case-MSC-14472-1; US-Patent-Appl-SN-502138) Avail:
NTIS HC $4.50 CSCL 088

A method of producing single-class and multi-class composite classification maps from multispectral data is provided. The multispectral data is transformed into a binary matrix format which is then encoded on an optical medium such as photographic film. The encoded data is holographically correlated with coded patterns representing selected spectral signatures to produce signal-class classification maps. Several single-class maps are optically superimposed to produce multi-class composite classification maps.
Includes design, installation, and testing of instrumentation systems; gyroscopes; measuring instruments and gages; recorders; transducers; aerial photography; and telescopes and cameras.

N74-22095* National Aeronautics and Space Administration. Pasadena Office, Calif.
THIN FILM GAUGE Patent

A thin film gauge for use in measuring distributed convective heat transfer rates occurring along given surfaces, is described. The gauge is particularly suited to measuring test surfaces in the air stream of a wind tunnel. The gauge is characterized by a plurality of painted platinum leads extend across the surface of a substrate; a pair of leads on the surface is adapted to deliver an electric current at a constant amperage through a selected thermally active area. Leads are also coupled at opposite sides of the thermally active area for detecting induced voltage drops occurring in the area so that the active length of the gauge is defined between voltage output leads. Changes in heat transfer to the thermally active area are isolated and determined by detecting induces changes in voltage drop.

Official Gazette of the U.S. Patent Office

N74-22112# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
PARTICULATE AND AEROSOL DETECTOR Patent Application

The invention relates to a device for detecting and counting micron size particles suspended in a gas. The basic principle of the sensor operation is that a charged capacitor can have a discharge initiated by the impact of a high velocity particle. With suitable construction methods and under appropriate biasing and impacting conditions, the impacting particle creates a discharge path which is self-healing; that is, the incident particle initiates a discharge path through which the capacitor discharges in such a fashion as to vaporize or blow out the conducting path in the process. Once the discharge action is complete, the low resistance path no longer exists between the two capacitor plates and the capacitor is again able to accept a charge. By monitoring the voltage on a capacitor plate the density and size of particles directed into the capacitor can be determined.

NASA

N74-22096* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LOW LEVEL SIGNAL LIMITER Patent

A limiting circuit is described which prevents a signal being supplied to a signal amplifier from exceeding a predetermined value. The circuit is designed to permit a signal voltage to be fed directly to a signal amplifier without passing through the operational amplifier and without being altered undesirably. When the signal level increases to the predetermined value, the summing point shifts from the input of the operational amplifier to the output of the limiting circuit.

D.L.G.
An apparatus for monitoring and analyzing electrical currents produced by lightning strikes is described. The apparatus includes an electrically conductive mast which has currents produced responsive to lightning strikes. A first circuit means is coupled to the mast for generating DC voltage proportional to a peak current generated in the mast by each lightning strike. The first circuit includes a first coil encircling the mast for sensing the flux change produced by current flowing through the mast which is caused by a lightning strike and for generating a voltage responsive thereto. An integrator is coupled to the first coil for generating an integrated voltage proportional to the flux change sensed by the first coil. A peak voltage detector is coupled to the integrator for generating a voltage having an amplitude proportional to the peak of the integrated voltage. A second circuit means is coupled to the mast for generating digital signal representative of the wave shape of the current generated in the mast by each lightning strike.

In a Fourier interference spectrometer of the doublepass retroreflector type, a single mirror is employed in the path of both split beams of an incoming ray to cause them to double back through separate retroreflectors. Changes in optical path length are achieved by linear displacement of both retroreflectors using a motor driven lead screw on one for large, low frequency changes, a moving-coil actuator on the other for smaller, mid-frequency changes and a piezoelectric actuator on one of these two for small, high frequency changes.

A novel apparatus for controlling the temperature of balloon-borne equipment is disclosed, the apparatus serving to utilize the radiant energy emitted by the earth and its atmosphere so as to control the temperature of equipment. The apparatus comprises a housing to be carried aloft by a balloon and defining an enclosure for an instrumentation package. The enclosure includes an upper shield portion as well as a bottom window portion at the base, the bottom window facing the earth below during flight. The upper shield portion is constructed of a material such as aluminized Mylar, which serves to reflect direct sunlight.

A strain transducer for use in the measurement of static or quasi-static high strain levels at stress concentration points in holes in flat plates is described. Cantilever springs constructed by machining the material to appropriate flexibility, permit self-alignment, and constant contact with the test specimen. Used in conjunction with a strain gage or other transducer, it enables testing far beyond the strain gage's normal limits for high strains and number of load cycles.
14 INSTRUMENTATION AND PHOTOGRAPHY

N74-25932* # National Aeronautics and Space Administration. Pasadena Office, Calif.
FLUORESCENCE DETECTOR FOR MONITORING ATMOSPHERIC POLLUTANTS Patent Application
(Contract NAS7-100)
(NASA-Case-NPO-13231-1; US-Patent-AppI-428993) Avail: NTIS HC $4.00 CSCL 14B

A gas molecule detector was used to discover the presence of pollutants in the atmosphere. A laser source excites the pollutants to fluorescence and emit a return signal to the detector. The pollutants are captured in a gas cell containing two compartments. The first absorbs the fluorescence from the signal and the second contains the absorbed emission. A difference measuring circuit detects the difference in output signals from the two compartments in order to obtain a signal indicative of the magnitude of the pollutant being analyzed. NASA

N74-26946* National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.
HOLOGRAPHY UTILIZING SURFACE PLASMON RESONANCES Patent

A holographic recording medium with a substrate which has a diffraction grating composed of a number of spaced line ridges on the surface is discussed. The first layer consists of a metal with a plasma wavelength shorter than that of the selected light source. A second layer, or coating, on top of the first layer consists of a thin film of photosensitive emulsion. A diagram of the device is provided. The principles of operation are explained.

Official Gazette of the U.S. Patent Office

N74-26945* National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.
DEVICE FOR MONITORING A CHANGE IN MASS IN VARYING GRAVIMETRIC ENVIRONMENTS Patent

A remotely operable device for detecting changes as they occur in the mass of a selected specimen is described. The device is characterized by a balance beam including at one end a support for receiving a specimen having a changing mass and suspension means, including a flexure, supporting the beam near its center of gravity for pivotal movement proportional to changes occurring in the mass of the specimen. Strain gages coupled with the flexure provide a read-out indicative of the pivotal movement imparted to the beam.

Official Gazette of the U.S. Patent Office

N74-26947* National Aeronautics and Space Administration.
Ames Research Center, Moffett Field, Calif.
CHROMATO-FLUOROGRAPHIC DRUG DETECTOR Patent
A drug detecting apparatus which includes a chromatographic system for separating particular substances from a sample solution passed through it is described. A source of radiation causes the substance to emit fluorescent radiation as it moves through the chromatographic system. An optical system spectrally separates the fluorescent radiation according to wavelength and for focusing particular portions of the separated spectrum through an exit aperture. A photodetector which is responsive to the radiation passing through the exit aperture develops an electrical signal commensurate with the intensity of the radiation. The electrical signal is recorded to provide an indication of certain characteristics of the substance.

The design and characteristics of a gas radiation counter are discussed. The coaxial anode consists of an elongated central wire covered with an electrically insulating sleeve. Several longitudinally discontinuous segments of an electrically conductive coating are disposed about the insulating sleeve in a coaxial pattern along the length of the central wire. The conductive coating segments form a veto or rejection anode at each end of the central wire and a main or primary charge detecting anode between the ends. The segments are coupled together so that the primary charge detecting anode is connected to detection circuitry in anti-coincidence with the veto anodes. Background radiation detected by either of the veto anodes and the primary charge detecting anode is rejected and the sensitivity of the radiation counter device is increased.

Two conductive screens located in the flow path of an electrophoresis sample separation apparatus are charged electrically. The sample is introduced between the screens, and the charge is sufficient to disperse and hold the samples across the screens. When the charge is terminated, the samples are uniformly distributed in the flow path. Additionally, a first separation by charged properties is accomplished.

Heat flow calorimeter devices are used to measure heat liberated from or absorbed by an object. This device is capable of measuring the thermal output of sealed nickel-cadmium batteries or cells during charge-discharge cycles. An elongated metal heat conducting rod is coupled between the calorimeter vessel and a heat sink, thus providing the only heat exchange path from the calorimeter vessel itself.
N74-27860* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

SPECIFIC WAVELENGTH COLORIMETER Patent

A self contained, specific wavelength, single beam colorimeter is described for direct spectrophotometric measurement of the concentration of a given solute in a test sample. An electrical circuit employing a photoconductive cell converts the optical output into a linear, directly readable meter output. The colorimeter is simple to operate and is adapted for use in zero gravity conditions. In a specific application, the colorimeter is designed to analyze the concentration of iodine in potable water carried aboard a space vehicle such as the 4B stage of Skylab.


STEADY STATE THERMAL RADIOMETERS Patent

A radiometer is described operating in a vacuum under steady state conditions. The front element is an aluminum sheet painted on the outer side with black or other absorptive material of selected characteristics. A thermocouple is bonded to the inner side of the aluminum sheet. That is backed by highly insulative layers of glass fiber and crinkled, aluminized Mylar polyester. Those layers are backed with a sturdy, polyester sheet, and the entire lamination is laced together by nylon cords. The device is highly reliable in that it does not drift out of calibration, and is significantly inexpensive.

N74-27862* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.

ELECTRIC FIELD MEASURING AND DISPLAY SYSTEM Patent

An apparatus is described for monitoring the electric fields of cloud formations within a particular area. It utilizes capacitor plates that are alternately shielded from the clouds for generating an alternating signal corresponding to the intensity of the electric field of the clouds. A synchronizing signal is produced for controlling sampling of the alternating signal. Such samplings are fed through a filter and converted by an analogue to digital converter into digital form and subsequently fed to a transmitter for transmission to the control station for recording.


CONDUCTIVE ELASTOMERIC EXTENSOMETER Patent

An extensometer was used for measuring surface area changes of the human body caused by expansion and contraction of the body. A relatively thin and wide strain responsive conductive elastomeric band was adapted for application to a part of the body, such as around a limb or the trunk of the body. The elastomeric band is incorporated as a resistor in a balanced bridge circuit. Expansion or contraction of the portion of the body on which the elastomeric band is applied causes a change in the resistance of the band and a resultant imbalance of the bridge circuit. The output of the amplifier in volts is suitable for proving the desired reading through a recorder, oscilloscope or voltmeter.

Official Gazette of the U.S. Patent Office
14 INSTRUMENTATION AND PHOTOGRAPHY

**N74-27865**
National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.

**DEVICE FOR MEASURING TENSILE FORCES Patent**
Sponsored by NASA

This device is characterized by an elongated body having predetermined elastic properties. An applied tensile force of any magnitude, within a given range, imparts to the body an elongation of a predetermined length. The magnitude of applied tensile force is indicated as a function of the angular motion afforded the threaded sleeve mounted on the body.

Official Gazette of the U.S. Patent Office

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**N74-27866**
National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.

**THREE MIRROR GLANCING INCIDENCE SYSTEM FOR X-RAY TELESCOPE Patent**

A telescope suitable for soft X-ray astronomical observations consists of a paraboloid section for receiving rays at a grazing angle and a hyperboloid section which receives reflections from the paraboloid at a grazing angle and directs them to a predetermined point of focus. A second hyperboloid section is centrally located from the other two surfaces and positioned to reflect from its outer surface radiation which was not first reflected by the paraboloid. A shutter is included to assist in calibration.

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**N74-27872**
National Aeronautics and Space Administration.
Ames Research Center, Moffett Field, Calif.

**G-LOAD MEASURING AND INDICATOR APPARATUS Patent Application**

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**N74-27875**
National Aeronautics and Space Administration.
Ames Research Center, Moffett Field, Calif.

**MODULATED HYDROGEN ION FLAME DETECTOR Patent Application**

In a hydrogen flame detector there is provided a means for modulating the density of a gas stream prior to its introduction into the detector flame. A detector, responsive to the resulting modulation of the flame, is provided for producing an output signal having a component fluctuating at the frequency of modulation. A cross-correlator, responsive to the output signal and a signal at the frequency of modulation, is provided for producing a resultant signal proportional to the cross-correlation between its two input signals. A means is further provided for recording or otherwise utilizing the resultant signal thus produced.

Official Gazette of the U.S. Patent Office

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**N74-28932**
National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.

**REAL TIME, LARGE VOLUME, MOVING SCENE HOLOGRAPHIC CAMERA SYSTEM Patent Application**
Robert L. Kurtz, inventor (to NASA) Filed 10 Aug. 1973 33 p
A holographic motion picture camera system producing resolution of front surface is described. The system utilizes a beam of coherent light and means for dividing the beam into a reference beam for direct transmission to a conventional film transport, and three reflection signal beams for transmission to the film transport by reflection from the three orthogonal sides of a moving scene. The system is arranged so that critical parts are positioned on the foci of three interrelated mathematically derived ellipses. The camera has the theoretical capability of producing motion picture holograms of an object moving at speeds as high as 900,000 cm/sec. Also, the system is capable of handling objects of relatively large volume moving in a random direction anywhere within a volume.

A flask having a threaded neck and a cap adapted for threaded engagement on the neck is described. A laminated disk between the cap and the neck forms a gas tight seal, and the cap has a central opening that exposes a medial region of the disk. Piercing the disk through the opening are two electrodes, the inner ends of which contact the sample within the flask and the outer ends of which afford connection of test equipment. Cylindric glass tubes are fitted over the external portion of the electrodes to provide physical support; silicone rubber or the like serves to retain the glass cylinders in place and form a gas tight seal between the cylinders and the electrodes. Shrinkable tubing is shrunk over the glass tubes to afford further mechanical support and sealing.

A nondispersive gas analyzer, which is responsive to the fluctuating intensity of radiation passed through a density modulated known and unknown gas sample, is described. As the radiation passes through the gases a signal containing the frequency modulation of the samples is generated. Included in the signal generation is a means for selectively amplifying those components directly related to the frequency of modulation of the known and unknown samples and means for forming a ratio of the components for generating a signal proportional to the density of the known gas in the unknown gas sample.

A capacitive transducer and circuit which consists of two capacitive electrodes and a shield electrode, and which is suited for making measurements in a high temperature environment is described. A rise in temperature causes resistance of the insulation between the capacitive electrode to decrease, and the resistive current to attempt to interfere with the capacitive current between the capacitive electrodes. The shield electrode and the circuit coupled to it reduces the resistive current in the transducer. A bridge-type circuit coupled to the transducer ignores the resistive current and measures only the capacitive current flowing between the capacitive electrodes.
14 INSTRUMENTATION AND PHOTOGRAPHY

A star scanner on a spin stabilized spacecraft is described which includes a reticle with a pair of slits having different separations as a function of the spacecraft vertical plane, to form a V slit. The time between a star image crossing one of the slits relative to a reference telemetry time provides an indication of azimuth angle. The time between the image crossing the two slits provides an indication of elevation angle of the star. If a star cluster is detected such that two stars pass the slits in less time than normally required for a single star to cross the two slits, an indication of the cluster occurrence is derived. Means are provided to prevent effective detection of large celestial bodies, such as the sun or moon.

Official Gazette of the U.S. Patent Office

A device which enables a person to record the location of measurements made by a hand held nonconducting probe is described. The hand probe is coupled to a linear potentiometer and a sine-cosine potentiometer by means that varies the output of the linear potentiometer proportional to the distance between the hand probe and the linear potentiometer and that varies the output of the sine-cosine potentiometer proportional to the angular movement of the hand probe relative to the sine-cosine potentiometer. The output of the linear potentiometer is applied directly to one input of the sine-cosine potentiometer and is applied through an inverter to the other input or the sine-cosine potentiometer. The cosine and sine outputs of the sine-cosine potentiometer are applied to the X and Y outputs, respectively, of an X-Y recorder.

Official Gazette of the U.S. Patent Office

A method and apparatus for measuring the stagnation pressure of supersonic velocity gas streams without the generation of shock waves which interfere with such measurements are given. The technique is insensitive to the type of gas and Mach number and is therefore particularly useful in the study of jet engine exhausts.

Official Gazette of the U.S. Patent Office

A method is described whereby accurate, reproducible results are obtained in the tensile testing of thin metal foils. The method consists of working the side edges of the test specimen until the edges are parallel and flaw-free, aligning the work specimen between space grip end members, and securing end portions of the aligned test specimen to the grip end members. An aligning apparatus employed in the method consists of an alignment box having a longitudinal bottom wall and two upright side walls with the first and second removable grip end members disposed at each end of the box, and with a means for securing the grip end members within the box. The grip end members are provided with means for receiving opposite end portions and aligning the test specimen.

NASA

A method and apparatus for recording the location of measurements made by a hand held nonconducting probe is described. The hand probe is coupled to a linear potentiometer and a sine-cosine potentiometer by means that varies the output of the linear potentiometer proportional to the distance between the hand probe and the linear potentiometer and that varies the output of the sine-cosine potentiometer proportional to the angular movement of the hand probe relative to the sine-cosine potentiometer. The output of the linear potentiometer is applied directly to one input of the sine-cosine potentiometer and is applied through an inverter to the other input or the sine-cosine potentiometer. The cosine and sine outputs of the sine-cosine potentiometer are applied to the X and Y outputs, respectively, of an X-Y recorder.

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NASA
14 INSTRUMENTATION AND PHOTOGRAPHY


Surface discontinuities of defects such as cracks and orifices are detected by applying a penetrating fluid, preferably a liquid, to a test surface so as to cause the liquid to penetrate any minute cracks or openings in the surface, removing the excess liquid from the surface, and leaving a residual in the discontinuities, cavities, or in the subsurface materials. A sheet of porous material impregnated with a sensitizing medium which will react with vapors of the residual liquid to form a visible pattern is applied to the test surface. The residual liquid trapped in the discontinuities, cavities, or subsurface material is vaporized, and, as the vapors contact the sensitizing medium on the sheet, a pattern corresponding to the discontinuity is formed on the sheet material and the penetrant completely removed from the sample.

Official Gazette of the U.S. Patent Office


Methods and apparatus are provided which employ ion time-of-flight techniques to determine the constituency of a high velocity particle of matter such as a micrometeorite. A charged target electrode is arranged to intercept the particle, the impact of which will create a discrete cloud or plasma of ions of both the target material as well as the particle matter. A charged collector electrode is spaced a preselected distance from the target electrode to receive the ions. However, the region between the two electrodes is established as a low density field-free region, and if the ions are then accelerated into the collector electrode at a proper body, the ions in the plasma will tend to travel at a velocity which is substantially a function of only the mass of the ion. Accordingly, the ions in the plasma will tend to separate into groups according to mass, and since each group of ions can be counted as well as identified as to mass, the ions of target material can be separated from the measurement.

NASA


An apparatus for manually adjusting large wall-mounted clocks, while the operator stands on the floor, is discussed. The device consists of a long handled tool which slips over the reset knob of the clock allowing a downward and twisting motion to adjust the indicated time. A diagram of the device is provided.

NASA
A color photographic film restoration system is described. The system is comprised of a source of coherent light illuminating an exposed film with a degraded image, a Fourier transform lens behind the exposed film, a spatial filter behind the transform lens, another Fourier transform lens behind the spatial filter, and an unexposed color film for recording a corrected representation of the degraded color image on the unexposed film. A total optical system is disclosed in which the spatial filter may comprise a photographic film whose transmittance characteristics restores the ratio of the zero to the higher spatial frequency components of image produced by the system. An opto-electronic system is also disclosed in which the spatial filter is a part of a digital computer.

A device for capturing, in space, meteoroid particles which are uncontaminated by the capture environment is described. The capture cell is a cube or other shaped cell of very pure material. The cell has one open side over which is fixed a thin membrane. An array of these cells is exposed to the space environment where it is eventually struck by a meteoroid. The particles of the meteoroid penetrate the membrane and are imbedded in the walls of the cell.
Mass spectrometry apparatus for analyzing the composition of moving microscopic particles is presented. The apparatus includes a capacitor with a front electrode upon which the particles impinge, a back electrode, and a solid dielectric sandwiched between the front and back electrodes. The electrodes and dielectric are arcuately shaped as concentric peripheral segments of different spheres having a common center and different radii. The front electrode and dielectric together have a thickness such that an impinging particle can penetrate them. The front electrode is negatively biased relative to the back electrode so that an impinging particle causes the front and back electrodes to become electrically connected to form a discharge spark between the electrodes. The discharge spark causes ejection from the front electrode of positive ions of elements in the impinging particle. Arrival times of different ions are measured to complete the analysis.

N74-32888*‡ National Aeronautics and Space Administration.
Goddard Space Flight Center, Greenbelt, Md.
MICROMETEOROID VELOCITY AND TRAJECTORY ANALYZER Patent Application
Siegfried O. Auer, inventor (to NASA) (NAS-NRC) Filed 30 Aug. 1974 24 p
(Contract NSR-09-01-087)

Movement of a charged particle through a region is detected by providing a detector including first, second and third spaced metal grids pervious to the particle and positioned so that the particles passes through them in sequence. The first and third grids are short-circuited to each other and to ground. A signal input terminal of a dc amplifier is connected in dc circuit with the second grid so that a voltage pulse induced in the second grid by the particle passing through the three results in an output pulse of the amplifier. A plurality of such detectors are arranged for enabling the position and velocity vectors of the charged particle to be detected in three mutually orthogonal axes X, Y and Z.

N74-32887*‡ National Aeronautics and Space Administration.
Goddard Space Flight Center, Greenbelt, Md.
MOVING PARTICLE COMPOSITION ANALYZER Patent Application
Siegfried O. Auer, inventor (to NASA) (NAS-NRC) Filed 30 Aug. 1974 19 p
(Contract NSR-09-01-087)
(NASA-Case-GSC-11889-1; US-Patent-Appi-SN-502124) Avail: NTIS HC $4.00 CSCL 14B

A detector for detecting ions and/or electrons present in a resonance cell of an ion cyclotron resonance spectrometer is discussed. The detector, which operates on the Q-meter principle, is driven by an external radio frequency oscillator capable of providing radio frequencies up to about 15 MHz at an adjustable low radio frequency signal level. The detector is connected across the resonance of the cell to detect ions by their cyclotron frequency. Electrons are detectable by connecting the detector across the cell’s trapping plates which detects the motion of the electrons, the frequency of which is in the megahertz range.

N74-32890*‡ National Aeronautics and Space Administration.
Pasadena Office, Calif.
ION AND ELECTRON DETECTOR FOR USE IN AN ICR SPECTROMETER Patent Application
Wesley T. Huntress, inventor (to NASA) (JPL) Filed 27 Aug. 1974 19 p
(Contract NAS7-100)
(NASA-Case-NPO-13479-1; US-Patent-Appi-SN-500981) Avail: NTIS HC $4.00 CSCL 14B
A Holographic Motion Picture Camera Patent

Robert L. Kurtz, inventor (to NASA) Filed 17 Sep. 1974

A holographic motion picture camera for producing three dimensional images was disclosed. The camera employs an elliptical optical system and a motion compensator is present in one of the beam paths; the compensator allows the camera to photograph fast moving objects.

HALL EFFECT MAGNETOMETER Patent Application

John A. Woollam, Harry A. Beale (Md. Univ.), and Ian L Spain, inventors (to NASA) (Md. Univ.) Filed 13 Dec. 1973

A magnetometer utilizing a single crystal of Bi2Se3 having a rhombohedral crystal structure is described along with a method for making such a device. The Bi2Se3 has a positive or negative Hall coefficient and a carrier concentration of about $10^{18}$ to $10^{20}$ per cubic centimeter.

FAST SCAN CONTROL FOR DEFLECTION TYPE MASS SPECTROMETERS Patent

Paul R. Yeager, Gianni Gaetano, and David B. Hughes, inventors (to NASA) (Bell and Howell Co., Pasadena, Calif.) Issued 10 Sep. 1974

A high speed scan device is reported that allows most any scanning sector mass spectrometer to measure preselected gases at a very high sampling rate. The device generates a rapidly changing staircase output which is applied to the accelerator of the spectrometer and it also generates defocusing pulses that are applied to one of the deflecting plates of the spectrometer which when shorted to ground deflects the ion beam away from the collector. A defocusing pulse occurs each time there is a change in the staircase output.

RAPID ACTIVATION AND CHECKOUT DEVICE FOR BATTERIES Patent Application

William J. Britz and William A. Boshers, inventors (to NASA) Filed 27 Jun. 1974

An apparatus is described for activating a battery by inserting
an electrolyte into the cells while making voltage measurements on each cell. The battery has a planar top with vertically extending passages providing access to the cells. It also has test points adjacent to each cell. A housing is mounted on top of the battery for supplying an electrolyte through sealed passages into the cells while simultaneously checking the voltage of the cells. The electrolyte is forced by pressure into the battery.

A method and apparatus is described for compensating for reflection losses in an optical path length modulated absorption-absorption gas analyzer used for determining the density of a reference gas in an unknown gas sample. The apparatus comprises a first chamber for containing a first gas including a reference gas at a known partial density and a second chamber for containing a second gas. A source of radiant energy is provided for passing radiant energy through the first and second chambers. Means are provided for modulating the path length of the radiant energy in the chambers. Additionally, a chopper wheel comprising a plurality of gas cells containing a sample of the reference gas is interspersed by a plurality of gas cells containing a gas excluding the reference gas.
MACHINE ELEMENTS AND PROCESSES

Includes bearings, seals, pumps, and other mechanical equipment; lubrication, friction, and wear; manufacturing processes and quality control; reliability; drafting; and materials fabrication, handling, and inspection.

AIRLOCK Patent

An airlock for use in transferring waste objects from a positively pressuresealed enclosure aboard an operative space vehicle, to a waste receiver attached to the vehicle and maintained at the negative pressure of a celestial space environment. The airlock is characterized by a shell having an internal chamber and hermetically sealed within an opening formed in a bulkhead of the enclosure. The shell is provided with an insertion hatch adjacent to the enclosure, and any other hatch adjacent the waste receiver, each of the hatches being hermetically sealed by a hatch cover supported for deployment to a hatch-opening position through a manipulation of a hatch-deploying mechanism. A three-way selector valve is coupled with the deploying mechanism and ported to the internal chamber of the shell, the enclosure, and the environment and is provided for alternatingly coupling the chamber with the enclosure and the receiver, in direct communication, in response to a manipulation of the mechanism whereby a sequence is imposed on the operation of the airlock.

Official Gazette of the U.S. Patent Office

ANTI-GRAVITY DEVICE Patent Application

A device for demonstrating the effects of gravity was developed. The device consists of two spheres of different radii, a small sphere resting on top of a larger one. The center of gravity of the small sphere is located below its geometric center. When the small sphere is rolled without slippage on the surface of the large sphere and then released, the small sphere will resume its original position, thus seeming to defy the law of gravity. The desired results will only be obtained if the small sphere is moved through an angle of less than 30 degrees.

P.N.F.
THE INVENTION OF AN APPARATUS FOR FORMING MATCHED PAIRS OF DISHED GRIDS HAVING A HIGH PERCENTAGE OF OPEN AREAS FOR ION THRUSTER ACCELERATOR SYSTEMS IS DISCUSSED. ALL THE BLANKS AND SHEETS ARE DISHED SIMULTANEOUSLY BY FORCING FLUID TO INFATE AN ELASTIC SHEET WHICH CAUSES THE DESIRED DEGREE OF DISTORTION. THE DISHED GRIDS ARE ALSO STRESS RELIEVED SIMULTANEOUSLY. DIAGRAMS OF THE FORMING DEVICE ARE PROVIDED.

A PLATING SYSTEM IS DESCRIBED IN WHICH A SUBSTRATE TO BE PLATED IS SUPPORTED ON A STATIONARY PLATFORM. A NOZZLE ASSEMBLY WITH A SMALL NOZZLE IS SUPPLIED WITH A PLATING SOLUTION UNDER HIGH PRESSURE, SO THAT A CONSTANT-FLOW STREAM OF SOLUTION IS DIRECTED TO THE SUBSTRATE. THE NOZZLE ASSEMBLY IS MOVED RELATIVE TO THE SUBSTRATE AT A SELECTED RATE AND MOVEMENT PATTERN. A POTENTIAL DIFFERENCE (VOLTAGE) IS PROVIDED BETWEEN THE SUBSTRATE AND THE SOLUTION IN THE ASSEMBLY. THE VOLTAGE AMPLITUDE IS MODULATED SO THAT ONLY WHEN THE AMPLITUDE IS ABOVE A MINIMUM KNOWN VALUE PLATING TAKES PLACE.

An improved joint is described for reducing the peak shear stress in adhesive bonds when adhesives are used to bond two materials which are in a lapped relationship and which differ in value of modulus of elasticity. An insert placed between the adhesive and one of the two materials acts to cushion the discontinuity of material stiffness thereby reducing the peak shear stress in the adhesive bond.

OFFICIAL GAZETTE OF THE U.S. PATENT OFFICE
LIGHT SHIELD AND COOLING APPARATUS Patent
Thomas G. Meador, Jr., inventor (to NASA) Issued 14 May 1974 4 p Filed 10 Nov. 1972 Supersedes N73-13474 (11 - 04, p 0426)

A light shield and cooling apparatus was developed for a high intensity ultraviolet lamp including water and high pressure air for cooling and additional apparatus for shielding the light and suppressing the high pressure air noise.

Official Gazette of the U.S. Patent Office

ROCK SAMPLING Patent

A method for sampling rock and other brittle materials and for controlling resultant particle sizes is described. The method involves cutting grooves in the rock surface to provide a grouping of parallel ridges and subsequently machining the ridges to provide a powder specimen. The machining step may comprise milling, drilling, lathe cutting or the like; but a planing step is advantageous. Control of the particle size distribution is effected primarily by changing the height and width of these ridges. This control exceeds that obtainable by conventional grinding.

Official Gazette of the U.S. Patent Office

ROCK SAMPLING Patent

An apparatus for sampling rock and other brittle materials and for controlling resultant particle sizes is described. The device includes grinding means for cutting grooves in the rock surface and to provide a grouping of thin, shallow, parallel ridges and cutter means to reduce these ridges to a powder specimen. Collection means is provided for the powder. The invention relates to rock grinding and particularly to the sampling of rock specimens with good size control.

Official Gazette of the U.S. Patent Office
A two speed drive system for a wheel of a vehicle by which shifting from one speed to the other is accomplished by: the inherent mechanism of the wheel is described. A description of the speed shifting operation is provided and diagrams of the mechanism are included. Possible application to lunar roving vehicles is proposed.
A MULTITARGET SEQUENTIAL SPUTTERING APPARATUS
Patent Application
Rindge Shima, inventor (to NASA) (JPL) Issued 22 Apr. 1974
22 p
(Contract NAS7-100)
(NASA Case-NPO-13345-1; US-Patent-App1-SN-462705) Avail:
NTIS HC $4.25 CSCL 13H

A sputtering apparatus includes a single cathode on which
a plurality of targets of different materials are supported, with a
rotatable anode, supporting a substrate and/or substrates,
spaced apart from the cathode in a chamber containing an inert
gas at a selected pressure. A potential difference is applied
between the cathode and anode to produce a plasma for each
target, which is sputtered by accelerated ions within the
plasma. Apertured plates and shields are positioned between
the targets and the anode to effectively separate the plasmas
into separate columns. The sputtered material from each target
having access to the substrate/substrates only through that
target's column.

DEVICE FOR CONFIGURING MULTIPLE LEADS Patent
Paul W. Clemens, inventor (to NASA) (Sperry Rand Corp.
Huntsville, Ala.) Issued 11 Jun. 1974 7 p Filed 2 Mar. 1973
Sponsored by NASA
(NASA-Case-MFS-22133-1; US-Patent-3,815,205;
Avail. US Patent Office CSCL 131

A device for simultaneously configuring multiple leads
projected from a printed circuit affixed to a circuit board is
described. The device is characterized by a receptacle adapted
to receive and support a circuit board having multiple leads, a
first locking mechanism for securing the base portion of the
leads against motion relative to the circuit board, and a second
locking mechanism, spaced from the receptacle and mounted
on a carriage for securing the distal end portions of the leads
relative to the carriage. The carriage, in turn, is supported for a
simultaneous motion in vertical and horizontal planes for imparting
selective motion to the carriage, so that leads secured by the
locking mechanisms are deformed to a preselected configura-
tion.

SPRAG SOLENOID BRAKE Patent
Dan H. Dan, inventor (to NASA) Issued 28 May 1974 5 p
Filed 14 May 1973 Supersedes N73-23552 (11 - 14.
p 1670)
(NASA-Case-MFS-21846-1; US-Patent-3,812,938;

The development and characteristics of an electrically
operated brake are discussed. The action of the brake depends
on energizing a solenoid which causes internally spaced sprockets
to contact the inner surface of the housing. A spring forces the
control member to move to the braking position when the electrical
function is interrupted. A diagram of the device is provided and
detailed operating principles are explained.

Official Gazette of the U.S. Patent Office
QUICK DISCONNECT FILTER COUPLING Patent Application
Fred Jankowski, inventor (to NASA) Issued 30 May 1974
The invention relates to a quick disconnect filter coupling for use in coupling a pair of lines together through which fluid passes. The device is particularly applicable in the space shuttle program wherein prior to re-using the space shuttle couplings utilized in fueling the launching the space shuttle must be cleaned for removing all contaminants therefrom. The quick disconnect filter coupling includes a male portion which is normally mounted on the skin of a missile adapted to receive a female portion. Within the male portion is a removable filter cartridge. The filter cartridge includes a check valve and a filter medium. Normally, before the coupling is re-used a purge assembly, is utilized for cleaning contaminants from the coupling device. The novelty of the invention appears to lie in providing a quick disconnect filter coupling which has a filter assembly that can be readily removed and a purging device coupled thereto for cleaning contaminants therefrom.

APPARATUS FOR INSERTING AND REMOVING SPECIMENS FROM HIGH TEMPERATURE VACUUM FURNACES Patent
Charles W. Whitehead, inventor (to NASA) Issued 18 Jun. 1974
The apparatus comprises a high speed gate valve for isolating the interior of the furnace from an air lock chamber on the opposite side of the gate valve. The air lock chamber is provided with valve ports connected to a vacuum source, a source of inert quenching gas, and the atmosphere, respectively. Attached to the end of the air lock chamber away from the furnace is a cylindrical tube having disposed within it a rod carrying specimen pan at the end towards the furnace and having mounted at its top end an annular magnet having a diameter slightly less than the interior diameter of the tube. The top end of the tube is closed by a removable cap. Encircling the tube in the vicinity of the magnet is a carbon steel ring which when axially moved along the tube causes the magnet to follow it and thereby controls the position of the rod and specimen pan within the tube.

MIXING INSERT FOR FOAM DISPENSING APPARATUS Patent Application
The design and operation of a device for mixing foam are described. The device may be used anywhere that ingredients are mixed and dispensed through a nozzle. One particular application is in dispensing polyurethane foam. The construction of the equipment is illustrated. The novelty of the equipment lies in the feature of forcing the ingredients through one side of the housing to the other as they flow through slots of alternate discs with the ingredients being divided and recombined.
CONCENTRIC DIFFERENTIAL GEARING ARRANGEMENT
Patent

Two input members and two concentric rotatable output members are interconnected by a planetary gear arrangement. The first input drives directly the first output. The second input engages a carrier having the planetary gears affixed thereto. Rotation of the carriage causes rotation of the central sun gear of the planetary gear system. The sun gear is journaled to the carriage and is drivingly connected to the second output through a direction reversing set of bevel gears. The first input drive member includes a ring gear drivingly connected to the planetary gears for driving the second output member in the same direction and by the same amount as the first output member. Motion of the first input results in equal motion of the two outputs while input motion of the second input results in movement of the second output relative to the first output. This device is useful where non-interacting two-axis control of remote gimbaled systems is required.

AIR CONDITIONING SYSTEM AND COMPONENT THEREFOR DISTRIBUTING AIR FLOW FROM OPPOSITE DIRECTIONS
Patent

The air conditioning system comprises a plurality of separate air conditioning units coupled to a common supply duct such that air may be introduced into the supply duct in two opposite flow directions. A plurality of outlets such as registers or auxiliary or branch ducts communicate with the supply duct and valve means are disposed in the supply duct at least some of the outlets for automatically channeling a controllable amount of air from the supply duct to the associated outlet regardless of the direction of air flow within the supply duct. The valve means comprises an automatic air volume control apparatus for distribution within the supply duct into which air may be introduced from two opposite directions. The apparatus incorporates a freely swinging movable vane in the supply duct to automatically channel into the associated outlet only the deflected air flow which has the higher relative pressure.

LATCH MECHANISM

A latching mechanism is described which has a latch member which will collapse when a latching surface is passed over it and brought into a position to engage the latch member. It will return and automatically engage the latching surface as the latching surface passes completely by the latch member. The latch member is pivotally attached to a linking member which is pivotally mounted in a housing. This arrangement makes the release and disengagement of the latch member from the latching surface easier and more expedient than was possible with capture latches. The improved capture.

N74-27901* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

N74-27902* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

N74-27903* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
A vessel having inlet and outlet valves is disposed in a container with a fluid to be pumped which may be evolved from a liquid in the container below the vessel. A magnetocaloric substance is disposed in the vessel and causes fluid vapor in the vessel to expand and be expelled through the outlet valve. Vapor is drawn in through the inlet valve as the substance cools. The inlet valves may be one-way check valves or may be solenoid valves energized at appropriate times by timing circuits. A timer controlled heating element may also be disposed in the vessel to operate in conjunction with the magnetic field.

N74-30916+ National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AUGER ATTACHMENT METHOD FOR INSULATION Patent Application
William C. Schneider, inventor (to NASA) Filed 24 Jul. 1974
11 p
(NASA-Case-MSC-12615-1; US-Patent-Appl-SN-491417) Avail: NTIS HC $4.00 CSCL 13E

An auger device is used to attach rigid surface insulation to a spacecraft. The auger is screwed into an insulation tile which has been predrilled. The auger tile combination is then fastened to the spacecraft using an attachment screw which penetrates the spacecraft skin, which is secured by a blind end fastener. In an alternate method, the auger is incorporated in the insulation tile when the tile is fabricated.

N74-27908* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
GRINDING ARRANGEMENT FOR BALL NOSE MILLING CUTTERS Patent
9 p Filed 14 Sep. 1972 Supersedes N73-10504 (11 - 01, p 0061)

A grinding arrangement for spiral fluted ball nose end mills and like tools includes a tool holder for positioning the tool relative to a grinding wheel. The tool is mounted in a spindle within the tool holder for rotation about its centerline and the tool holder is pivotably mounted for angular movement about an axis which intersects that centerline. A follower arm of a cam follower secured to the spindle cooperates with a specially shaped cam to provide rotation of the tool during the angular movement of the tool holder during the grinding cycle, by an amount determined by the cam profile. In this way the surface of the cutting edge in contact with the grinding wheel is maintained at the same height on the grinding wheel throughout the angular movement of the tool holder during the grinding cycle.
APPARATUS FOR FORMING DRIVE BELTS Patent
Albert Topits, Jr., inventor (to NASA) (JPL) Issued 3 Sep. 1974
10 p Filed 31 Aug. 1973 Supersedes N73-31442 (11 - 22, p 2677) Sponsored by NASA
An apparatus for manufacturing belts, such as seamless belts, is provided, the apparatus has relatively movable rollers that are mounted in an oven. A belt blank, for example, of a thin polyester film, is rotated on the rollers as heat is applied. Four rollers, each mounted on a separate roller assembly, are movable along appropriate tracks while a fifth centrally located roller is stationary. A pair of dc motors are operatively connected to a speed reduction gear assembly to provide a pair of rotating drive shafts that extend into the oven. One rotating shaft drives all of the rollers through a rotational gear assembly while the other drive shaft is capable of positioning the movable rollers through respective rotating threaded shafts. Control devices are provided for controlling the motors while measuring devices are operatively connected to the positional drive shaft to indicate the position of the rollers.

TOOL FOR USE IN LIFTING PIN SUPPORTED OBJECTS Patent
A tool for use in lifting a pin-supported electronic package mounted in juxtaposition with the surface of an electronic circuit board is described. The tool is configured to be received beneath a pin-supported package and is characterized by a manually operable linkage, including an elongated, rigid link which is supported for axial reciprocation and a pivotal link pinned to the body and supported for oscillation induced in response to axial motion imparted to the rigid link. A lifting plate is pivotally coupled to the distal end of the pivotal link so that oscillatory motion imparted to the pivotal link serves to move the plate vertically for elevating the plate into lifting engagement with the electronic package positioned thereabove.

METHOD OF ELECTROFORMING A ROCKET CHAMBER Patent
A transpiration cooled rocket chamber is made by forming a porous metal wall on a suitably shaped mandrel. The porous wall may be made of sintered powdered metal, metal fibers sintered on the mandrel or wires woven onto the mandrel and then sintered to bond the interfaces of the wires. Intersecting annular and longitudinal ribs are then electroformed on the porous wall. An interchamber wall having orifices therein is then electroformed over the annular and longitudinal ribs. Parallel longitudinal ribs are then formed on the outside surface of the interchamber wall after which an annular jacket is electroformed over the parallel ribs to form distribution passages therewith. A feed manifold communicating with the distribution passages may be fabricated and welded to the rocket chamber or the feed manifold may be electroformed in place.
Apparatus for compression molding of thermosetting plastics compositions including interfitting hollow male and female components is reported. The components are adapted to be compressed to form a rocket nozzle in a cavity. A thermal jacket is provided exteriorly adjacent to the female component for circulating a thermal transfer fluid to effect curing of a thermosetting plastics material being molded. Each of the male and female components is provided with suitable inlets and outlets for circulating a thermal transfer fluid.

Official Gazette of the U.S. Patent Office
APPARATUS FOR POSITIONING MODULAR COMPONENTS ON A VERTICAL OR OVERHEAD SURFACE Patent Application
An apparatus for holding several modular components against a surface is described. A flexible fixture prepositions the components and a vacuum develops a uniform pressure which presses and holds the fixture and objects in place. The surface may be curved, vertical, or overhead. Diagrams of the device are provided.

ATOMIC STANDARD WITH VARIABLE STORAGE VOLUME Patent Application
A cylindrical, convoluted, flexible bellows is used to form an atomic or molecular storage vessel with constant surface area and surface properties but adjustable volume. When utilized as a storage bulb inside an atomic or molecular frequency standard such as a hydrogen maser, it provides an apparatus for obtaining an extremely accurate measurement of the frequency deviation caused by the interaction of gas atoms (or molecules) with the vessel wall surface (i.e., the so-called wall shift).

MINIATURE HYDRAULIC ACTUATOR Patent Application
A miniature reversible rotary actuator is reported that operates by hydraulic fluid pressure. A shaft mounted vane is free to displace angularly within a chamber under the influence of fluid pressure introduced at either extremity of the chamber. When appropriate internal and external sealing is used, the actuator is capable of exerting a very high torque in either rotative direction relative to its size and weight. Use of an incompressible actuating fluid enables it to be used as a precision positioner and to respond quickly and accurately to changes in fluid pressure inputs.
AN EXTERNALLY SUPPORTED INTERNALLY STABILIZED FLEXIBLE DUCT JOINT. Patent Application

A description is given of an externally supported internally stabilized flexible duct joint particularly suited for use in conducting the flow of fluid between a pair of tubular conduits, at least one of which is supported for motion relative to the other. The joint is characterized by a low-flow loss coefficient and includes a pair of coaxially related terminal sleeves adapted to be coupled with adjacently disposed conduits, and an elongated bellows extended between the terminal sleeves. The bellows is supported against thrust induced extension by linkage including a gimbal ring concentrically related to the mid-span of the bellows and a pair of terminal supports affixed to the terminal sleeves and journaled to the gimbal ring. A bellows stabilizing sleeve is disposed within the bellows for avoiding flow impingement and preventing lateral shifting while a support ring is mounted on the stabilizing sleeve and connected to the mid-span of the bellows for connecting the bellows with the stabilizing sleeve.

NASA
16 MASERS

Includes applications of masers and lasers. For basic research see: 26 Physics. Solid-State.

N74-32937# National Aeronautics and Space Administration. Pasadena Office, Calif.
SCHOTTKY BARRIER LASER ENERGY CONVERTER Patent Application
Richard J. Stinn (JPL) and Yea-Chuan M. Yeh, inventors (to NASA) (JPL) Filed 27 Aug. 1974 15 p
(Contract NAS7-100)
(NASA-Case-NPO-13390-1; US-Patent-Appl-SN-501013) Aval:
NTIS HC #4.00 CSCL 20E

A Schottky barrier (SB) type cell for conversion of laser beam energy of wavelength of 0.6 microns and less is described. The cell consists of a thin layer of semiconductor material with a band gap of about 2eV or more, and a very thin layer of semitransparent metal on the order of 100 deg. A or less, deposited on the semiconductor material. Contacts are deposited on the bottom side of the semiconductor material and on top of the metal layer, the latter contact in the form of the grid structure.

N74-34012# National Aeronautics and Space Administration. Pasadena Office, Calif.
DOUBLE DISCHARGE METAL VAPOR LASER WITH METAL HALIDE AS A LASANT Patent Application
Gary R. Russell (JPL), Che-Jen Chen (JPL), and Noble M. Nerheim, inventors (to NASA) (JPL) Filed 3 Oct. 1974 10 p
(Contract NAS7-100)
(NASA-Case-NPO-13448-1; US-Patent-Appl-SN-511888) Aval:
NTIS HC #4.00 CSCL 20E

A double discharge metal vapor laser in which a metal halide is used as the lasing, is disclosed. The laser includes a heated discharge tube within which a metal halide is contained. The discharge tube is provided with a pair of electrodes for producing electrical discharges. The ends of the tube are closed with a pair of Brewster windows outside of which are positioned a pair of suitable mirrors. Heating of the discharge tube and the metal halide contained within it produces metal halide vapor. A first electrical discharge causes dissociation of the metal halide vapor to produce metal atoms. After a predetermined time delay to permit metastable relaxation of the metal atoms, a second electrical discharge acts as a pumping pulse to produce a population inversion and hence lasing.

N74-34010# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPATIAL FILTER FOR Q-SWITCHED LASERS Patent Application
Ralph F. Wuerker and Lee O. Heflinger, inventors (to NASA) Filed 2 Oct. 1974 9 p
(NASA-Case-LEW-12164-1; US-Patent-Appl-SN-511334) Aval:
NTIS HC #4.00 CSCL 20E

A spatial filtered Q-switched laser system is disclosed having means to prevent ionization of air in close proximity to the aperture of the spatial filter. A compound lens system having an astigmatic focus is found between the laser and the spatial filter for defocusing the light beam emanating from the laser in the vicinity of the aperture of the spatial filter to an intensity below that which produces ionization of air. The preferred construction of the compound lens system as viewed from the laser comprises a cylindrical lens and a pair of positive lenses.
17 MATERIALS, METALLIC

Includes cermet; corrosion; physical and mechanical properties of materials; metallurgy; and applications as structural materials. For basic research see: 06 Chemistry. For related information see also: 18 Materials, Nonmetallic; and 32 Structural Mechanics.

N74-27983# National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.

COATING SUPERALLOYS Patent Application
(NASA-Case-LEW-11696-3; US-Patent-AppI-SN-483853) Avail: NTIS HC $4.00 CSCL 11F

An analysis was made of the protection provided to superalloy and dispersion strengthened alloy surfaces by an aluminized coating. The coatings have long time oxidation and thermal fatigue resistance properties.
18 MATERIALS, NONMETALLIC

Includes corrosion; physical and mechanical properties of materials (e.g., plastics); and elastomers, hydraulic fluids, etc. For basic research see: 06 Chemistry. For related information see also: 17 Materials. Metallic; 27 Propellants; and 32 Structural Mechanics.

N74-23125* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

REINFORCED STRUCTURAL PLASTICS Patent

N74-27037* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

INTUMESCENT COMPOSITION, FOAMED PRODUCT PREPARED THEREWITH AND PROCESS FOR MAKING SAME Patent

N74-30001* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

METHOD OF REPAIRING DISCONTINUITY IN FIBERGLASS STRUCTURES Patent

N74-27035* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

METHOD OF LAMINATING STRUCTURAL MEMBERS Patent

N74-27038* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

METHOD OF REPAIRING DISCONTINUITY IN FIBERGLASS STRUCTURES Patent

N74-27037* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

INTUMESCENT COMPOSITION, FOAMED PRODUCT PREPARED THEREWITH AND PROCESS FOR MAKING SAME Patent

N74-30001* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

METHOD OF REPAIRING DISCONTINUITY IN FIBERGLASS STRUCTURES Patent

N74-27038* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

METHOD OF LAMINATING STRUCTURAL MEMBERS Patent

N74-23125* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Damaged fiberglass structures are repaired by substantially filling the irregular surfaced damaged area with a liquid, self-curing resin, preferably an epoxy resin mixed with chopped fiberglass, and then applying to the resin surface the first of several woven fiberglass swatches which has stitching in a zig-zag pattern parallel to each of its edges and a fringe of warp and fill glass fibers about the edges outward of the stitching. The method is especially applicable to repair of fiberglass rocket engine casings and is particularly advantageous since it restores the repaired fiberglass structure to substantially its original strength without any significant changes in the geometry or mass of the structure.

Official Gazette of the U.S. Patent Office

Low density, fibrous, rigid, silica insulations are rendered impervious to moisture by application of a ceramic glaze coating comprising a silica barrier layer, and an emissivity glaze layer comprising a high silica glass component, an emissivity agent, and a borosilicate glass component. The resulting ceramic glaze laminate adhered to the fibrous silica insulation provides a moisture-impervious insulating material which exhibits a high emissivity and is resistant to delamination and spalling at repeated cycles of thermal shock.

NASA
Includes calculation methods and theory; and numerical analysis. For applications see specific categories. For related information see also: 08 Computers.

No abstracts in this subject category.
21 NAVIGATION

Includes guidance; autopilots; star and planet tracking; inertial platforms; and air traffic control. For related information see also: 07 Communications.

N74-28097* National Aeronautics and Space Administration.
Goddard Space Flight Center, Greenbelt, Md.

PASSIVE DUAL SPIN MISALIGNMENT COMPENSATORS
Patent
Supersedes N73-11680 (11-02, p 0207).

A combination dual-spin gyroscopically stabilized device is described having a spinning rotor and a non-spinning platform. Two substantially lossless mechanical resonators, resonant at the spin frequency, are orthogonally positioned on the platform for compensation for the disturbing torque acting on the platform due to rotor misalignment.

Official Gazette of the U.S. Patent Office

N74-35098* National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.

AN ATTITUDE CONTROL SYSTEM Patent Application
(NASA-Case-MFS-22787-1; US-Patent-Appl-SN-511348) Avail: NTIS HC $4.00 CSCL 22B

An attitude control system for space vehicle is reported in which angular rate signals are generated by rate gyros mounted closely adjacent to gimbaled engines at the rear of a vehicle, and wherein error signals representative of a commanded change in vehicle angle or attitude are obtained from a precision inertial platform located in the nose region of the vehicle. The rate gyro derived signals dominate at high frequencies where dynamic effects become significant, and platform signals dominate at low frequencies where precision signals are required for a steady vehicle attitude. The blended signals are applied in a conventional manner to control the gimbaling of vehicle engines about control axes.
22 NUCLEAR ENGINEERING

Includes nuclear reactors and nuclear heat sources used for propulsion and auxiliary power. For basic research see: 24 Physics, Atomic, Molecular, and Nuclear. For related information see also: 03 Auxiliary Systems; and 28 Propulsion Systems.

No abstracts in this subject category.
PHYSICS, GENERAL

Includes acoustics, cryogenics, mechanics, and optics. For astrophysics see: 30 Space Sciences. For geophysics and related information see also: 13 Geophysics, 20 Meteorology; and 29 Space Radiation.

An improved helium refrigerator is described with a plurality of counter-flow heat exchangers and a maximum reserve cooling capacity. The final, or low temperature heat exchanger is substantially filled with liquid helium. An electrical bridge circuit including a pair of temperature-responsive resistors is mounted on the low temperature heat exchanger for providing a continuous indication of the reserve cooling capacity of the refrigerator.

A liquid crystal image converter that allows viewing while the image is being recorded in real time is presented. The converter is comprised of an opaque layer inserted between the liquid crystal layer and the photoconductor layer for shielding the photoconductor layer from the light for viewing the image formed in the liquid crystal layer, and for allowing an electric current to flow through the opaque layer whereby the image in the crystal can be viewed while it is being formed without interfering with the image forming process. This device is used to convert a nonvisible image, in the infrared or ultraviolet, into a visible image.


An improved helium refrigerator is described with a plurality of counter-flow heat exchangers and a maximum reserve cooling capacity. The final, or low temperature heat exchanger is substantially filled with liquid helium. An electrical bridge circuit including a pair of temperature-responsive resistors is mounted on the low temperature heat exchanger for providing a continuous indication of the reserve cooling capacity of the refrigerator.

Author


A digital servocontrol system for random noise excitation of a test object in a reverberant acoustic chamber employs a plurality of sensors spaced in the sound field to produce signals in separate channels which are decorrelated and averaged. The average signal is divided into a plurality of adjacent frequency bands cyclically sampled by a time division multiplex system, converted into digital form, and compared to a predetermined spectrum value stored in digital form. The results of the comparisons are used to control a time-shared up-down counter to develop gain control signals for the respective frequency bands in the spectrum of random sound energy picked up by the microphones.

Author


A liquid crystal image converter that allows viewing while the image is being recorded in real time is presented. The converter is comprised of an opaque layer inserted between the liquid crystal layer and the photoconductor layer for shielding the photoconductor layer from the light for viewing the image formed in the liquid crystal layer, and for allowing an electric current to flow through the opaque layer whereby the image in the crystal can be viewed while it is being formed without interfering with the image forming process. This device is used to convert a nonvisible image, in the infrared or ultraviolet, into a visible image.

Author
Methods and apparatus for coating a curved surface in a zero gravity environment to form a mirror are reported. NASA
Includes atomic, molecular and nuclear physics. For applications see: 22 Nuclear Engineering. For related information see also: 29 Space Radiation.

No abstracts in this subject category.
A procedure, using a light beam of predetermined wavelength, preferably monochromatic, for measuring plasma characteristics is presented. Light absorbed by the plasma is used to obtain an absorption coefficient for the plasma. From this known coefficient and independent measurement of either the electron density or temperature of the plasma, an equation may be solved to obtain other unknown quantities. In this procedure, the absorption coefficient of the plasma is derived simultaneously for two probing light beams of substantially different predetermined wavelengths. These two coefficients are used to solve the two equations, which are in turn used to determine plasma electron density and temperature.

Official Gazette of the U.S. Patent Office

A self-energized plasma compressor which compresses plasma discharged from a coaxial plasma generator is described. The device includes a helically shaped coil which is coaxially aligned with the center axis of the generator. The plasma generator creates a current through the helical coil, which, in turn,
PHYSICS, SOLID-STATE

Includes semiconductor theory; and superconductivity. For applications see: 16 Masers. For related information see also: 10 Electronics.

N74-27281*# National Aeronautics and Space Administration.
Langley Research Center, Langley Station, Va.

VAPOR PHASE GROWTH OF GROUPS III-V COMPOUNDS BY HYDROGEN CHLORIDE TRANSPORT OF THE ELEMENTS Patent Application
(NASA-Case-LAR-11144-1; US-Patent-Appl-SN-426405) Avail: NTIS HC $4.00 CSCL 20L

An apparatus for forming binary, ternary, and quaternary compounds derived from elements of Groups III - V was developed. The apparatus employs a fused quartz growth tube coated with carbon to prevent impurities from being diffused into the crystal being grown. The tube is purged and cleaned after crystal growth by passing hydrogen chloride gas through it. By changing the carrier gas flow rates over various elements, the crystal composition can be graded and controlled to almost any desired product. The preparation of gallium arsenide crystals with good single crystal qualities of the epitaxial layer is described. NASA
A solid propellant composition of improved efficiency is described which includes an oxidizer containing ammonium perchlorate, and a powered metal fuel, preferably aluminum or beryllium, in the form of a composite. The metal fuel is contained in the crystalline lattice framework of the oxidizer, as well as within the oxidizer particles, and is disposed in the interstices between the oxidizer particles of the composition. The propellant composition is produced by a process comprising the crystallization of ammonium perchlorate in water, in the presence of finely divided aluminum or beryllium. A suitable binder is incorporated in the propellant composition to bind the individual particles of metal with the particles of oxidizer containing occluded metal.
PROPULSION SYSTEMS

Includes air breathing, electric, liquid, solid, and magnetohydrodynamic propulsion. For nuclear propulsion see: 22 Nuclear Engineering. For basic research see: 23 Physics, General; and 33 Thermodynamics and Combustion. For applications see: 31 Space Vehicles. For related information see also: 27 Propellants.

SUPERSONIC FAN BLADING Patent
Arthur W. Goldstein, inventor (to NASA) Issued 28 Jun. 1974
Radially extending rotor blades are disposed on a hub to form a supersonic propulsion fan for a turbofan engine. The peripheral spacing of the blades is such as to avoid forming a channel or passageway between adjacent blades. Each has a flat trailing surface extending from the leading edge at least as far to the rear as to cause any pressure waves which might originate on the blade surface to strike the leading surface of the following blade rather than propagate upstream of the blade row. The flat trailing surface of each blade makes an angle with the axis of rotation such that the blade is parallel to a gas inflow into the blades. Official Gazette of the U.S. Patent Office

ROCKET CHAMBER AND METHOD OF MAKING Patent Application
Anthony Fortini, inventor (to NASA) Issued 24 Jan. 1974
A transpiration cooled rocket chamber is made by forming a porous metal wall on a suitably shaped mandrel. The porous wall may be made of sintered powdered metal, metal fibers sintered on the mandrel or wires woven onto the mandrel and then sintered to bond the interfaces of the wires. Intersecting annular and longitudinal ribs are then electroformed on the porous wall. An interchamber wall having orifices therein is then electroformed over the annular and longitudinal ribs. Parallel longitudinal ribs are then formed on the outside surface of the interchamber wall after which an annular jacket is electroformed over the parallel ribs to form distribution passages therewith. A feed manifold communicating with the distribution passages may be fabricated and welded to the rocket chamber or the feed manifold may be electroformed in place. Author

EXHAUST FLOW DEFLECTOR Patent Application
The development of an exhaust gas deflector for helicopters is discussed. The deflector straightens the swirling exhaust flow to provide better penetration of the freestream. Diagrams are provided to show the operation of the equipment. The device also eliminates heating of the airframe and discoloration of the surface due to the exhaust gases. NASA

N74-28226 National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SUPERSONIC FAN BLADING Patent
Arthur W. Goldstein, inventor (to NASA) Issued 28 Jun. 1974
Radially extending rotor blades are disposed on a hub to form a supersonic propulsion fan for a turbofan engine. The peripheral spacing of the blades is such as to avoid forming a channel or passageway between adjacent blades. Each has a flat trailing surface extending from the leading edge at least as far to the rear as to cause any pressure waves which might originate on the blade surface to strike the leading surface of the following blade rather than propagate upstream of the blade row. The flat trailing surface of each blade makes an angle with the axis of rotation such that the blade is parallel to a gas inflow into the blades. Official Gazette of the U.S. Patent Office

N74-28233 National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ROCKET CHAMBER AND METHOD OF MAKING Patent Application
Anthony Fortini, inventor (to NASA) Issued 24 Jan. 1974
A transpiration cooled rocket chamber is made by forming a porous metal wall on a suitably shaped mandrel. The porous wall may be made of sintered powdered metal, metal fibers sintered on the mandrel or wires woven onto the mandrel and then sintered to bond the interfaces of the wires. Intersecting annular and longitudinal ribs are then electroformed on the porous wall. An interchamber wall having orifices therein is then electroformed over the annular and longitudinal ribs. Parallel longitudinal ribs are then formed on the outside surface of the interchamber wall after which an annular jacket is electroformed over the parallel ribs to form distribution passages therewith. A feed manifold communicating with the distribution passages may be fabricated and welded to the rocket chamber or the feed manifold may be electroformed in place. Author

N74-28232 National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ROCKET CHAMBER AND METHOD OF MAKING Patent Application
Anthony Fortini, inventor (to NASA) Issued 24 Jan. 1974
A transpiration cooled rocket chamber is made by forming a porous metal wall on a suitably shaped mandrel. The porous wall may be made of sintered powdered metal, metal fibers sintered on the mandrel or wires woven onto the mandrel and then sintered to bond the interfaces of the wires. Intersecting annular and longitudinal ribs are then electroformed on the porous wall. An interchamber wall having orifices therein is then electroformed over the annular and longitudinal ribs. Parallel longitudinal ribs are then formed on the outside surface of the interchamber wall after which an annular jacket is electroformed over the parallel ribs to form distribution passages therewith. A feed manifold communicating with the distribution passages may be fabricated and welded to the rocket chamber or the feed manifold may be electroformed in place. Author
28 PROPULSION SYSTEMS

N74-31269* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

SPUTTERING HOLES WITH ION BEAMLETS Patent


Ion beamlets of predetermined configurations are formed by shaped apertures in the screen grid of an ion thruster having a double grid accelerator system. A plate is placed downstream from the screen grid holes and attached to the accelerator grid. When the ion thruster is operated holes having the configuration of the beamlets formed by the screen grid are sputtered through the plate at the accelerator grid.

Official Gazette of the U.S. Patent Office

N74-31270* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

VARIABLY POSITIONED GUIDE VANES FOR AERODYNAMIC CHOKING Patent


A choking device to cause a sonic barrier to be formed which reduces the transmission of noise in a direction opposed to the direction of air flow in a compressor that may be part of an aircraft gas turbine engine is described. The noise reduction is accomplished by proper shaping and movement of inlet guide vanes, and an actuator is connected to selected guide vanes to effect movement by programmed amounts as required to choke or partially choke within the design range of the axial-flow-air compressor.

Official Gazette of the U.S. Patent Office

N74-33220* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

CASCADE PLUG NOZZLE Patent Application


An exhaust nozzle for jet aircraft is reported which provides suppression of jet noise with a minimum loss of thrust. The segmented nozzle contains a plurality of jet exits which break up the sound waves.

N74-33218* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

ABATING EXHAUST NOISES IN JET ENGINES Patent


A noise abating improvement for jet engines including turbojets, turboprops, turboprop jets, ramjets, scramjets, and hybrid jets is introduced. A provision is made for an apparatus in the primary and/or secondary flow streams of the engines; the apparatus imparts to the exhaust gases a component rotation or swirl about the engine's longitudinal axis. The rotary component in the exhaust gases causes a substantial suppression of sound energy build up normally produced by an axial flow exhaust system.

Official Gazette of the U.S. Patent Office
29 SPACE RADIATION

Includes cosmic radiation; solar flares; solar radiation; and Van Allen radiation belts. For related information see also: 13 Geophysics, and 24 Physics, Atomic, Molecular, and Nuclear.

No abstracts in this subject category.
30 SPACE SCIENCES

Includes astronomy and astrophysics; cosmology; lunar and planetary flight and exploration; and theoretical analysis of orbit and trajectory. For related information see also: 11 Facilities, Research and Support; and 31 Space Vehicles.

No abstracts in this subject category.
31 SPACE VEHICLES

Includes launch vehicles; manned space capsules; clustered and multistage rockets; satellites; sounding rockets and probes; and operating problems. For basic research see: 30 Space Sciences. For related information see also: 28 Propulsion Systems; and 32 Structural Mechanics.

N74-27380* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

A chemical system for releasing a good yield of free barium atoms and barium ions to create ion clouds in the upper atmosphere and interplanetary space for the study of the geophysical properties of the medium is presented.

Official Gazette of the U.S. Patent Office

N74-33303* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

A space vehicle system consisting of an orbiter vehicle with an expendable propellant tank attached to its underside surface is reported. An engine module is retractably supported from the aft end of the orbiter vehicle and extends beneath it so as to be in axial alignment with the propellant tank when in operation. After the engine has consumed the propellant, it is retracted to the orbiter vehicle and the tank is jettisoned thus reducing orbiter weight and improving flight characteristics.

NASA


An improved system for use in imposing directional stability on a rocket-propelled vehicle is discussed. The system includes a pivotally supported engine-mounting platform, a gimbal ring mounted on the platform and adapted to pivotally support a rocket engine, hydraulic actuator connected to the platform for imparting selected pivotal motion, a accelerometer and a signal comparator circuit for providing error intelligence indicative of aberration in vehicle acceleration, and an actuator control circuit connected with the actuator and responsive to error intelligence for imparting pivotal motion to the platform. A relocation of the engine’s thrust vector is achieved for imparting directional stability to the vehicle.
32 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; thermal stress; impact phenomena; vibration; flutter; inflatable structures; and structural tests. For related information see also: 17 Materials, Metallic; and 18 Materials, Nonmetallic.

TECHNIQUE FOR BONDING Patent Application
(NASA-Case-LAR-10073-1; US-Patent-SN-436317) Avail: NTIS HC $4.00 CSCL 11D
A method for molding a silicone elastomer into a fiberglass honeycomb panel previously bonded to a face sheet panel, is presented. The elastomer is introduced into a mold under vacuum to prevent air entrapment, and the bonded honeycomb panel is positioned above the elastomer filled mold and forced into the elastomer for vacuum filling the honeycomb structure. NASA

THRUST-ISOLATING MOUNTING Patent
A supporting frame for a load, such as one or more telescopes, is isolated from all multi-gravitational forces, which will be developed within that load as that load is propelled into space, by using a shroud to fully and solidly hold that load until that load has been propelled into space. Thereafter, that shroud will be jettisoned; and then supports which are on, and which are movable with, that load will have surfaces thereon moved into supporting engagement with complementary surfaces on that supporting frame to enable that supporting frame and those supports to fully and solidly hold that load. Official Gazette of the U.S. Patent Office
33 THERMODYNAMICS AND COMBUSTION

Includes ablation, cooling, heating, heat transfer, thermal balance, and other thermal effects; and combustion theory. For related information see also: 12 Fluid Mechanics; and 27 Propellants.
34 GENERAL

Includes information of a broad nature related to industrial applications and technology, and to basic research; defense aspects; information retrieval; management; law and related legal matters; and legislative hearings and documents.

No abstracts in this subject category.
This bibliography is issued in two sections: Section 1 - Abstracts, and Section 2 - Indexes. This issue of the Abstract Section cites 193 patents and applications for patent introduced into the NASA scientific and technical information system during the period of July 1974 through December 1974. Each entry in the Abstract Section consists of a citation, an abstract, and, in most cases, a key illustration selected from the patent or application for patent. This issue of the Index Section contains entries for 2757 patent and application for patent citations covering the period May 1969 through December 1974. The Index Section contains five indexes — subject, inventor, source, number and accession number.
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